INDUSTRIAL MEDICINE AND SURGERY

INDUSTRIAL MEDICINE

The International Journal of Medicine in Industry

This Journal is dedicated to the advancement of sound industrial medicine, including the surgery of industrial trauma. To that end its varying contents will embrace scientific papers, reports, digests, news items and official statements, together with editorial comment. The editorial policy is to avoid undue censorship. Some contributions ably prepared will be published although contravening the personal opinions of the editors. Care will be exercised in checking the accuracy of known facts, as printed, but in all other respects statements and opinions are those of the author and may not be shared by the editors. On any article, the editors reserve the right to comment favorably or otherwise, in the current or any subsequent issue. On this basis, contributions are invited. The opinions expressed in any contributions, including the editorials of this Journal, do not necessarily reflect the attitude or opinions of any associated organization.

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INDUSTRIAL MEDICINE AND SURGERY, The Journal of Medicine in Industry (with which are consolidated "The Industrial Doctor" and "International Journal of Medicine and Surgery"): Entered as second class matter August 28, 1941, at the Post Office at Chicago, Illinois, under the Act of March 3, 1879. Reentered, October 3, 1949. Additional entry at Sheboygan, Wisconsin. Published on the fifth of each month by INDUSTRIAL MEDICINE PUBLISHING COMPANY, Chicago. STEPHEN G. HALOS, Chairman; HAROLD A. HOOPER, Treasurer; STEPHEN F. HALOS, President; A. D. CLOUD, Publisher; CAREY P. MCCORD, M.D., Editor; DORIS L. FLOURNOY, Managing Editor; LUCILLE H. GROSS, Circulation Manager. Member, Audit Bureau of Circulations. PUBLICATION, EDITORIAL AND EXECUTIVE OFFICES, 605 North Michigan Avenue, Chicago 11, Illinois. Miami Office, 5301 S. W. 76th Street, Miami, Florida. Subscription $6.00 per year in the United States; $8.00 (U.S. Currency) per year in Canada; $12.00 (U.S. Currency) per year in other countries. Single copies 75 cents. Title Registered in United States Patent Office. Registered Canada, 1942. Copyright, 1957, by INDUSTRIAL MEDICINE PUBLISHING COMPANY. CHANGE OF ADDRESS: FOUR weeks notice required; changes cannot be made without old address as well as new; please furnish zone number for new address if city requires it.

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1958 INDUSTRIAL HEALTH CONFERENCE, ATLANTIC CITY, APRIL 19-25

INDUSTRIAL MEDICINE AND SURGERY

DECEMBER, 1957

Who Practices Industrial Medicine?

Results of a Survey in Oklahoma

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WELL-KNOWN to industry's physicians is the fact that many medical practitioners render care to industrially employed persons. That this has been established is given witness by the vast number of physical examinations completed by private physicians, and by the extensive remedial care rendered under workmen's compensation insurance coverage by thousands of specialists to men and women injured on the job. In questioning a group of generalists or practitioners of any specialty label, one is informed usually that they practice no industrial medicine.

Why is there a difference between the known facts of the case and the denied participation in this variety of medical care?

Presumably, in the professional-social lamination of our medical body, there is a disinclination to identify with occupational medicine, irrespective of how lucrative its practice might be, or how large this kind of task might bulk with the individual physician.

The Survey Plan

IN ORDER to identify more accurately the rate of participation in this specialty, a survey was envisioned of all physicians engaged in the practice of medicine in the State of Oklahoma. The membership of the Oklahoma State Medical Association numbered approximately 1700 at the time that its roster was sought for mailing purposes. A questionnaire was prepared, reviewed, and forwarded with a covering explanatory letter that gave the reasons for the study. (Resident physicians, retired members, and others not in active practice were not included, so that 1520 physicians were solicited.)

Of the questionnaires distributed, 740 were returned, representing a response of 48.6%. Anonymity was requested and maintained, except for a return coupon which could be filled in if the respondent wished additional information regarding activities or opportunities in industrial medicine.

On receipt of the questionnaires, statistical summaries and cross-classifications were made.

The Findings

THE replies to the question, *"What is your specialty?"* are shown in the order of frequency in Table I.

In 272 of those received, or 36.7%, a subspecialty was declared. These appear in Table II.

It might be of interest to note irrelevant, but nonetheless revealing, answers given to these two items of specialty or subspecialty. One person entered his specialty as that of "country doctor," while one gayer practitioner termed his sub-

TABLE I.
SPECIALTY OF RESPONDENTS

Specialty	Number	Percent
General Practice	318*	43.0%
Internal Medicine	89	12.0
General Surgery	79	10.7
Obstetrics, Gynecology	38	5.1
Ophthalmology and Otorhinolaryngology	28	3.8
Orthopedic Surgery	28	3.8
Pediatrics	18	2.4
Radiology	17	2.3
Ophthalmology	16	2.2
Industrial Medicine	13	1.8
Urology	13	1.8
Anesthesiology	9	1.2
Neurosurgery	7	0.9
Public Health	7	0.9
Dermatology	6	0.8
Pathology	6	0.8
Allergy	5	0.7
Psychiatry	5	0.7
Industrial Surgery	4	0.5
Otorhinolaryngology	4	0.5
Neuropsychiatry	3	0.4
Thoracic Surgery	3	0.4
Tuberculosis	3	0.4
Cardiology	2	0.3
Gastroenterology	2	0.3
Hospital Administration	2	0.3
Plastic Surgery	2	0.3
Preventive Medicine	2	0.3
Rheumatology	2	0.3
Student Health	2	0.3
Anatomy	1	0.1
Endocrinology	1	0.1
Geriatrics	1	0.1
Hematology	1	0.1
Industrial and medical-legal consultant	1	0.1
Proctology	1	0.1
Pulmonary Diseases	1	0.1
Total	740	99.9%

*Includes 60 who stated "None" in reply to this question.

specialty as "Cherokee Medicine Man," and the other released his feelings with the response of "answering questionnaires."

The relationship of the practitioner to teaching was questioned. As is known, there is but one medical school in the state — at Oklahoma City — but through the preceptorships in the fourth year, academic appointments as preceptors are given to physicians through the state, many at considerable distance from the capital city. The participation in teaching of the respondents is shown in Table III.

Oklahoma has two large cities, Oklahoma City and Tulsa, and the remainder of the communities vary greatly from centers of moderate industrial development to extremely small unincorporated agricultural districts. The range in populations coursed from under 1000 to 300,000 and over. The only city approximating the 300,000 level is Oklahoma City, and this breakdown was used to keep the graduations rounded. Table IV points out the sizes of the communities in which the respondents practice.

Although Oklahoma is young compared with other states, having been admitted to the Union in 1907, the practice of medicine goes back farther than the currently celebrated half-century of statehood would indicate. There were practitioners during the days when it was still Indian Territory. The distribution appears in Table V.

One physician, desirous of qualifying his response to the point of exactitude, indicated "82 years."

Most germane to the questionnaire was the next item of affiliation with industry in one of several categories. Table VI demonstrates the

TABLE II.
SUBSPECIALTY OF RESPONDENTS

Subspecialty	Number	Percent
General Surgery	60	22.0%
General Practice	31	11.4
Obstetrics, Gynecology	27	9.9
Cardiology	18	6.6
Internal Medicine	15	5.5
Pediatrics	13	4.8
Allergy	11	4.0
Anesthesiology	7	2.6
Industrial Medicine	7	2.6
Industrial Surgery	7	2.6
Thoracic Surgery	7	2.6
Orthopedic Surgery	6	2.2
Gastroenterology	5	1.8
Neurology	4	1.5
Oncology	4	1.5
Ophthalmology and Otorhinolaryngology	4	1.5
Otorhinolaryngology	4	1.5
Public Health	4	1.5
Rheumatology	4	1.5
Endocrinology	3	1.1
Psychiatry	3	1.1
Radiology	3	1.1
Urology	3	1.1
Hematology	2	0.7
Hand Surgery	2	0.7
Dermatology	2	0.7
Plastic Surgery	2	0.7
Peripheral Vascular Diseases	2	0.7
Pulmonary Diseases	2	0.7
Tuberculosis	2	0.7
Anatomy	1	0.4
Clinical Pathology	1	0.4
Electroencephalography	1	0.4
Obesity	1	0.4
Ophthalmology	1	0.4
Pathology	1	0.4
Preventive Medicine	1	0.4
Proctology	1	0.4
Total	272	100.1%

TABLE III.
PARTICIPATION IN TEACHING

	Number	Percent
Engaged in teaching full-time	19	2.0%
Engaged in teaching part-time	248	33.7
Not engaged in teaching	471	64.0
Not stated	2	0.3
Total	740	100%

TABLE IV.
SIZE OF COMMUNITIES WHEREIN RESPONDENTS PRACTICE

Population	Number	Percent
1. Under 1,000	6	0.8%
2. 1,000 - 5,000	72	9.8
3. 5,000 - 10,000	69	9.4
4. 10,000 - 15,000	51	6.8
5. 15,000 - 20,000	32	4.3
6. 20,000 - 30,000	81	11.0
7. 30,000 - 50,000	68	9.2
8. 50,000 - 100,000	39	5.3
9. 100,000 - 200,000	8	1.1
10. 200,000 - 300,000	102	13.8
11. 300,000 and over	188	25.4
12. Not stated	24	3.2
Total	740	100.1%

TABLE V.
LENGTH OF PRACTICE OF RESPONDENTS

Years of Practice	Number	Percent
Under 1 year	23	3.1%
1 - 5 years	158	21.4
5 - 10 years	166	22.4
10 - 15 years	88	11.9
15 - 20 years	75	10.1
20 - 25 years	70	9.5
Over 25 years	143	19.3
Not stated	17	2.3
Total	740	100%

TABLE VI.
AFFILIATION WITH INDUSTRY OR TYPE OF INDUSTRIAL MEDICAL PRACTICE OF RESPONDENTS

Type of Practice	Yes	No	Percent
Full-time in a plant	12	728	1.6%
Part-time in a plant	22	718	3.0
Consultant only — on call	140	600	19.0
Consultant only — office	275	465	37.2
Pre-employment physical exams (in office)	362	378	49.0
Care for industrially injured (in office)	481	259	65.0
Other*	102	638	13.8

*Of the 102 specifying another type of industrial medical activity, 50 indicated that they cared for occupationally injured patients in hospitals, while the remainder served as consultants for Federal and state installations, performed examinations on executives, rendered consultative services to industrially injured patients under the care of other physicians, or classified their association with one or another railroad as "other."

TABLE VII.
REFERRAL AND MEDICAL CARE PRACTICES

	Number	Percent
Do you serve as the sole physician for referral for industrial injuries or illnesses for any industry?	Yes: 174 No: 566	23.5% 76.5
Do you serve as the physician for any industry rendering a *complete* (occupational plus nonoccupational conditions) medical care plan to its employees?	Yes: 107 No: 633	14.5 85.5
The same to its employees *and* families?	Yes: 66 No: 674	9.0 91.0

types of industrial medical practice being done.

In compiling the above it was learned that 79.5% of the respondents did carry on one or more of the types of industrial medical practice indicated. Many of these were double entries, some of the physicians performing multiple types of services.

In order to learn something of referral practices in industry, and to determine if any concerns provided complete care for their employees or families, specific questions were asked, and the replies appear in Table VII.

Pertinent to this review is the extent of the financial return accruing from care rendered to industrial employees. In Table VIII, these percentage values are given. It is to be noted that 75.3% of the 740 physicians reporting derived some income from these sources.

To effect a parallel study of income and the amount of time devoted to this kind of practice, the percentage of time was asked, and the distribution of the replies is shown in Table IX. Of those indicating participation, 72.2% devoted some time to industrial medical practice.

Table X provides the kinds of industry served by the respondents. For simplicity's sake, the numerous types of industries indicated by the physicians who replied were placed in seven general categories, and multiple connections with industrial companies are indicated.

It would be of interest to compare the data of this table with the distribution of employees by type of industry, as listed by, and furnished by the Oklahoma State Department of Labor. The high total of government employees is explained by the presence of one large air maintenance

TABLE VIII.
PERCENTAGE OF INCOME DERIVED FROM INDUSTRIAL MEDICAL PRACTICE

Percentage of Income	Number 740	Percent of Respondents
None	182	24.6%
Less than 5%	155	21.0
5%	98	13.2
10%	137	18.5
20%	53	7.2
30%	29	3.9
40%	9	1.2
50%	10	1.3
60%	2	0.3
70%	2	0.3
80%	5	0.7
90%	3	0.4
100%	9	1.2
"Very small"	45	6.1
Not stated	1	0.1
Total	740	99.9%

TABLE IX.
PERCENTAGE OF TIME DEVOTED TO INDUSTRIAL MEDICAL PRACTICE

Percentage of Time	Number 740	Percent
None	203	27.4%
Less than 10%	297	40.1
10%	123	16.6
20%	45	6.1
30%	30	4.1
40%	10	1.4
50%	11	1.5
60%	0	0
70%	1	0.1
80%	6	0.8
90%	2	0.3
100%	9	1.2
Not stated	3	0.4
Total	740	100.0%

TABLE X.
TYPES OF INDUSTRIES SERVED BY RESPONDENTS

Industry	Number	Percent
Petroleum	94	12.7%
Manufacturing	47	6.4
Service	38	5.2
Public Utility	15	2.0
Commercial	4	0.5
Research	3	0.4
Other	58	7.8
None	217	29.3
Multiple industries	264	35.7
Total	740	100.0%

TABLE XI.
RESPONDENTS INTERESTED IN "DOING INDUSTRIAL WORK" IN THE FUTURE

	Number	Percent
Interested	230	31.0%
Not interested	510	69.0

XUM

depot and several armed services installations.

Trade (Wholesale 34,500; Retail 111,100)		145,600
Government		120,700
Manufacturing (Durable goods	50,300	91,000
Nondurable	40,700)	
Service		62,300
Petroleum (or Mining)		51,000
Public Utility		48,700
Contract Construction		35,100
Insurance and Real Estate		22,700
Total		577,100

A specific question was asked, if the respondent would "be interested in doing any industrial work if . . . . not doing so at present?" The replies appear in Table XI. The discrepancy between the figure of 69.0% and that of 79.5% (Table VI) — those physicians now practicing some industrial medicine — is explained by the fact that some of those replying "not interested" implied no desire for *additional* work.

Those particularly interested, of course, and who wished to be advised of new opportunities, completed the tear-off coupon and returned it by mail. There were 413 completed coupons received, of which 22 were forwarded after being detached from the questionnaire.

Cross Classifications

APART from these summaries, certain cross classifications were made which appear in Tables XII through XXII.

Comment

BECAUSE of the highly qualitative character of many of the replies, no statistical evaluation was attempted to identify significant differences among certain of the percentage values shown. Actually, in the State of Oklahoma, more physicians are practicing one form or another of industrial medicine than actually are shown in the tabulations. A small number of physicians who engage in industrial medicine as full-time practitioners in plants, failed to return the questionnaires. Others pursuing specialties totally unrelated to the medicine of industry, in their own interpretation, did not complete the questionnaires, for they believed that negative data were not desired.

Particular reference is made to Table VII, which apparently was misunderstood by the respondents, most likely because of a lack of clarity in the wording of the specific questions. Many physicians assumed erroneously that industry renders complete care to its employees for both occupational and nonoccupational conditions, because emergency attention would be given certain conditions, and because others of a minor nature were treated in order to allow the employee to complete the work shift. Few, if any, industrial installations in the state offer a complete medical care plan for employees and their families. A misinterpretation must have been made in this instance of the hospitalization insurance policies and other insurance underwritings which, at first blush, would seem to provide total in-patient and outpatient care.

Because of the inaccuracies inherent in the interpretations given by the respondents, the data appearing in Table VII, and in those tables derived from this compilation, i.e., Tables XII, XIII, and XVI, are to be questioned.

Many of the cross-classifications appearing in Tables XII to XXII are to be regarded as highly qualitative and for scanning interest only. The paucity of numbers in many of these tables does not permit the drawing of any conclusions which

TABLE XII.
RESPONDENTS SERVING AS SOLE PHYSICIAN FOR REFERRAL OF INDUSTRIALLY INJURED OR ILL FROM ANY ONE INDUSTRY, BY SPECIALTY

Specialty	Serving as Sole Physician for Industrially Injured or Ill		Serving as Sole Physician for Occupational and Nonoccupational Conditions	
	Number	Percent	Number	Percent
Generalists	103*	32.3%	69†	21.6%
General Surgeons	28	35.4	11	13.9
Orthopedic Surgeons	15	53.5	2	7.1
Industrial Physicians	8	61.5	3	23.0
Internists	6	6.7	10	11.2
Ophthalmologists —Otorhinolaryngologists	4	14.2	3	10.7
Industrial Surgeons	2	50.0	—	—
Obstetricians, Gynecologists	2	5.5	1	2.6
Dermatologists	1	16.6	1	16.6
Ophthalmologists	1	6.2	—	—
Radiologists	1	5.8	1	5.8
Thoracic Surgeons	1	33.3	1	33.3
Urologists	1	7.6	1	7.6
Rheumatologists	1	50.0	—	—
Cardiologists	—	—	1	50.0
Otolaryngologists	—	—	1	33.3
Psychiatrists	—	—	1	20.0
Tuberculosis Specialists	—	—	1	33.3
Total	174		107	

*Includes 20 who stated "none" in reply to specialty category question.

†Includes 14 who stated "none" in reply to specialty category question.

TABLE XIII.
RESPONDENTS SERVING AS SOLE PHYSICIANS FOR INDUSTRY OR FOR ALL MEDICAL CONDITIONS

Specialty	Percentage of all Specialty Groups	Sole Physician for Industry	Sole Physician for Occupational and Nonoccupational Conditions
Generalists	43.0%	59.2%	64.5%
General Surgeons	10.7	16.1	10.3
Orthopedic Surgeons	3.8	8.6	1.9
Industrial Physicians	1.8	4.6	2.8
Internists	12.0	3.4	9.4
Ophthalmologists — Otorhinolaryngologists	3.8	2.3	2.8
Industrial Surgery	0.5	1.1	—
Obstetricians, Gynecologists	5.1	1.1	0.9
Dermatologists	0.8	0.6	0.9
Ophthalmologists	2.2	0.6	—
Radiologists	2.3	0.6	0.9
Thoracic Surgeons	0.4	0.6	0.9
Urologists	1.8	0.6	0.9
Rheumatologists	0.3	0.6	—
Cardiologists	0.3	—	0.9
Otolaryngologists	—	—	0.9
Psychiatrists	0.7	—	0.9
Tuberculosis Specialists	0.4	—	0.9

TABLE XIV.

PERCENTAGE OF INCOME DERIVED FROM INDUSTRIAL MEDICAL PRACTICE BY SPECIALTY

Specialty	Percent of Income	Number 740	Percent Within Specialty
Allergy	"Very small"	1	20.0%
	0	4	80.0
Total		5	100.0%
Anesthesiology	10%	2	22.2%
	Less than 5	2	22.2
	"Very small"	1	11.1
	0	4	44.4
Total		9	99.9%
Cardiology	Less than 5%	1	50.0%
	0	1	50.0
Total		2	100.0%
Dermatology	Less than 5%	4	66.7%
	"Very small"	1	16.7
	0	1	16.7
Total		6	100.1%
Generalists*	70%	1	0.3%
	60	1	0.3
	50	3	0.9
	40	3	0.9
	30	9	2.9
	20	29	9.1
	10	85	26.7
	5	58	18.3
	Less than 5	63	19.8
	0	42	13.2
	"Very small"	23	7.3
	Not stated	1	0.3
Total		318	100.1%
General Surgery	100%	1	1.3%
	80	1	1.3
	50	3	3.7
	40	1	1.3
	30	6	7.6
	20	9	11.4
	10	19	24.1
	5	14	17.7
	Less than 5	18	22.8
	"Very small"	3	3.8
	0	4	5.0
Total		79	100.0%
Industrial Medicine	100%	5	38.4%
	90	3	23.1
	80	3	23.1
	70	1	7.7
	Less than 5	1	7.7
Total		13	100.0%
Industrial Surgery	100%	2	50.0%
	80	1	25.0
	40	1	25.0
Total		4	100.0%
Internal Medicine	100%	1	1.1%
	40	1	1.1
	30	1	1.1
	20	2	2.3
	10	9	10.1
	5	8	9.0
	Less than 5	35	39.3
	"Very small"	5	5.6
	0	27	30.4
Total		89	100.0%
Neuropsychiatry	20%	1	33.3%
	0	2	66.6
Total		3	99.9%
Neurosurgery	30%	3	42.9%
	20	1	14.3
	10	1	14.3
	5	2	28.6
Total		7	100.1%
Obstetrics and Gynecology	10%	3	7.9%
	5	1	2.6
	Less than 5	2	5.3
	"Very small"	4	10.5
	0	28	73.7
Total		38	100.0%
Ophthalmology	30%	1	7.7%
	20	1	7.7
	10	3	23.1
	Less than 5	5	38.5
	"Very small"	1	7.7
	0	2	15.4
Total		13	100.1%
Ophthalmology and Otorhinolaryngology	20%	3	10.7%
	10	9	32.1
	5	3	10.7
	Less than 5	8	28.6
	"Very small"	4	14.3
	0	1	3.6
Total		28	100.0%
Orthopedic Surgery	60%	1	3.6%
	50	4	14.3
	40	3	10.7
	30	8	28.6
	20	6	21.4%
	10	3	10.7
	5	1	3.6
	Less than 5	1	3.6
	0	1	3.6
Total		28	100.1%
Otorhino-laryngology	Less than 5%	3	75.0%
	0	1	25.0
Total		4	100.0%
Pathology	Less than 5%	1	16.6%
	0	5	83.3
Total		6	99.9%
Plastic Surgery	20%	1	50.0%
	5	1	50.0
Total		2	100.0%
Proctology	Less than 5%	1	100.0%
Total		1	100.0%
Psychiatry	10%	1	20.0%
	0	4	80.0
Total		5	100.0%
Public Health	Less than 5%	1	14.3%
	0	6	85.7
Total		7	100.0%
Pulmonary Diseases	0%	1	100.0%
Total		1	100.0%
Radiology	5%	5	29.4%
	Less than 5	3	17.6
	"Very small"	2	11.8
	0	7	41.2
Total		17	100.0%
Rheumatology	10%	1	50.0%
	0	1	50.0
Total		2	100.0%
Thoracic Surgery	5%	1	33.3%
	Less than 5	1	33.3
	0	1	33.3
Total		3	99.9%
Urology	30%	1	7.7%
	10	1	7.7
	5	1	7.7
	Less than 5	5	38.5
	0	5	38.5
Total		13	100.1%

*Includes 60 who stated "None" in reply to specialty category question.

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would speak for industrial medical practice as it is seen today.

It must be emphasized that the Oklahoma story is not typical, for this state, like several in the Southwest, has yet to develop the concepts of occupational medicine that characterize the programs known in the large establishments of metropolitan industrial areas. Rarely does the consultant physician visit the plant whose preplacement physical examinations he is conduct-

TABLE XV.
PERCENTAGE OF TIME DEVOTED TO INDUSTRIAL MEDICAL PRACTICE BY SPECIALTY

Specialty	Percent of Time	Number 740	Percent Within Specialty
Allergy	Less than 10%	3	60.0%
	0	2	40.0
Total		5	100.0%
Anesthesiology	10%	1	11.1%
	Less than 10	2	22.2
	0	6	66.6
Total		9	99.9%
Cardiology	Less than 10%	1	50.0%
	0	1	50.0
Total		2	100.0%
Dermatology	10%	1	16.7%
	Less than 10	4	66.7
	0	1	16.7
Total		6	100.1%
Generalists*	70%	1	0.3%
	50	4	1.3
	40	3	0.9
	30	9	2.8
	20	24	7.6
	10	73	23.0
	Less than 10	155	48.7
	0	45	14.1
	Not stated	4	1.3
Total		318	100.0%
General Surgery	80%	1	1.3%
	50	3	3.8
	40	1	1.3
	30	7	8.9
	20	9	11.4
	10	16	20.2
	Less than 10	32	40.5
	0	9	11.4
	Not stated	1	1.3
Total		79	100.1%
Industrial Medicine	100%	6	46.1%
	90	2	15.4
	80	4	30.8
	Less than 10	1	7.7
Total		13	100.0%
Industrial Surgery	100%	2	50.0%
	80	1	25.0
	50	1	25.0
Total		4	100.0%
Internal Medicine	100%	1	1.1%
	30	2	2.3
	20	2	2.3
	10	7	7.9
	Less than 10	40	44.9
	0	36	40.4
	Not stated	1	1.1
Total		89	100.0%
Neuropsychiatry	10%	1	33.3%
	0	2	66.6
Total		3	99.9%
Neurosurgery	30%	3	43.0%
	10	2	28.5
	Less than 10	2	28.5
Total		7	100.0%

*Includes 60 who stated "None" in reply to specialty category question.

Specialty	Percent of Time	Number 740	Percent Within Specialty
Obstetrics, Gynecology	10%	2	5.5%
	Less than 10	6	16.5
	0	30	78.0
Total		38	100.0%
Ophthalmology and Otorhinolaryngology	20%	2	7.1%
	10	10	35.7
	Less than 10	12	42.9
	0	4	14.3
Total		28	100.0%
Ophthalmology	30%	1	6.3%
	20	1	6.3
	10	3	18.7
	Less than 10	9	56.2
	0	2	12.5
Total		16	100.0%
Orthopedic Surgery	50%	3	10.7%
	40	3	10.7
	30	8	28.6
	20	5	17.9
	10	4	14.3
	Less than 10	3	10.7
	0	2	7.1
Total		28	100.0%
Otorhinolaryngology	Less than 10%	3	75.0%
	0	1	25.0
Total		4	100.0%
Pathology	Less than 10%	1	16.6%
	0	5	83.4
Total		6	100.0%
Pediatrics	0%	18	100.0%
Total		18	100.0%
Plastic Surgery	20%	1	50.0%
	Less than 10	1	50.0
Total		2	100.0%
Preventive Medicine	Less than 10%	1	50.0%
	0	1	50.0
Total		2	100.0%
Proctology	Less than 10%	1	100.0%
Total		1	100.0%
Psychiatry	10%	2	40.0%
	0	3	60.0
Total		5	100.0%
Public Health	Less than 10%	2	28.6%
	0	5	71.4
Total		7	100.0%
Pulmonary Diseases	0%	1	100.0%
Total		1	100.0%
Radiology	Less than 10%	8	47.0%
	0	9	53.0
Total		17	100.0%
Rheumatology	Less than 10%	1	50.0%
	0	1	50.0
Total		2	100.0%
Thoracic Surgery	Less than 10%	2	66.6%
	0	1	33.3
Total		3	99.9%
Urology	Less than 10%	8	61.0%
	0	5	39.0
Total		13	100.0%

ing, or to whose injured employees he renders care. These tabulations depict only what is contemporary practice, as 740 physicians in this state view it. For an area whose industrialization has assumed greater dimension only since World War II, the extent of industrial medical practice is marked. It is possible that with the leadership demonstrated by the petroleum and aircraft industries, others presently in Oklahoma, and those

TABLE XVI.

RESPONDENTS SERVING AS SOLE PHYSICIANS FOR REFERRALS FROM INDUSTRY AND FOR INDUSTRIES RENDERING COMPLETE MEDICAL CARE BY POPULATION GROUP

Population of Community	Total in Population Group	Sole Physician for Referrals		Complete Medical Care Practice of Associated Industry	
		Yes	%	Yes	%
Under 1,000	6	2	33.3%	1	16.7%
1,000 - 5,000	72	26	36.1	17	23.6
5,000 - 10,000	69	19	27.5	16	23.2
10,000 - 15,000	51	20	39.2	16	31.4
15,000 - 20,000	32	9	28.1	6	18.7
20,000 - 30,000	81	14	17.2	13	16.0
30,000 - 50,000	68	15	22.0	12	17.6
50,000 - 100,000	39	14	35.8	4	10.3
100,000 - 200,000	8	1	12.5	2	25.0
200,000 - 300,000	102	19	18.6	12	11.8
300,000 and over	188	31	16.4	7	3.7
Not stated	24	4*	16.4	1†	4.2

*"Not stated" insofar as community size was concerned, but specific as to referral data.

†"Not stated" insofar as community size was concerned, but specific as to medical care plan.

TABLE XVII.

PERCENTAGE OF INCOME DERIVED FROM INDUSTRIAL MEDICAL PRACTICE BY POPULATION OF COMMUNITY

Population of Community	Percent of Income	Number 740	Percent Within Population Group
Under 1,000	5%	2	33.3%
	Less than 5	1	16.6
	0	3	50.0
Total		6	99.9%
1,000 - 5,000	100%	1	1.4%
	80	1	1.4
	50	1	1.4
	20	8	11.1
	10	21	29.2
	5	9	12.5
	Less than 5	12	16.7
	"Very small"	6	8.3
	0	13	18.0
Total		72	100.0%
5,000 - 10,000	100%	1	1.4%
	50	1	1.4
	30	1	1.4
	20	7	10.2
	10	16	23.2
	5	15	21.8
	Less than 5	13	18.9
	"Very small"	6	8.7
	0	8	11.6
	Not stated	1	1.4
Total		69	100.0%
10,000 - 15,000	70%	1	2.0%
	50	2	3.9
	30	3	5.9
	20	3	5.9
	10	23	45.1
	5	9	17.6
	Less than 5	8	15.7
	0	2	3.9
Total		51	100.0%

TABLE XVII — CONT'D.

Population of Community	Percent of Income	Number 740	Percent Within Population Group
15,000 - 20,000	40%	2	6.3%
	30	4	12.5
	20	2	6.3
	10	9	28.1
	5	3	9.4
	Less than 5	8	25.0
	"Very small"	1	3.1
	0	3	9.4
Total		32	100.1%
20,000 - 30,000	100%	2	2.5%
	50	2	2.5
	40	1	1.2
	30	2	2.5
	20	10	12.3
	10	15	18.5
	5	16	19.8
	Less than 5	16	19.8
	"Very small"	4	4.9
	0	13	16.0
Total		81	100.0%
30,000 - 50,000	90%	1	1.5%
	20	10	14.7
	10	9	13.2
	5	10	14.7
	Less than 5	20	29.4
	"Very small"	4	5.9
	0	14	20.6
Total		68	100.0%
50,000 - 100,000	40%	1	2.6%
	30	5	12.8
	20	2	5.1
	10	5	12.8
	5	8	20.5
	Less than 5	7	18.0
	"Very small"	3	7.7
	0	8	20.5
Total		39	100.0%
100,000 - 200,000	10%	2	25.0%
	5	1	12.5
	Less than 5	3	37.5
	"Very small"	1	12.5
	0	1	12.5
Total		8	100.0%
200,000 - 300,000	100%	1	1.0%
	90	1	1.0
	80	1	1.0
	70	1	1.0
	50	2	2.0
	40	1	1.0
	30	6	5.8
	20	2	2.0
	10	13	12.7
	5	10	9.8
	Less than 5	20	19.6
	"Very small"	8	7.8
	0	36	35.3
Total		102	100.0%
300,000 and over	100%	3	1.6%
	90	1	0.5
	80	3	1.6
	60	2	1.0
	50	2	1.0
	40	4	2.1
	30	8	4.3
	20	8	4.3
	10	22	11.7
	5	15	8.0
	Less than 5	43	22.9
	"Very small"	9	12.5
	0	68	36.2
Total		188	100.0%
Not Stated*	100%	1	4.2%
	20	1	4.2
	10	2	8.3
	Less than 5	4	16.7
	"Very small"	3	12.5
	0	13	54.1
Total		24	100.0%

*"Not stated" insofar as community size was concerned, but specific as to income.

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TABLE XVIII.

SIZE OF COMMUNITY WHERE RESPONDENTS PRACTICE BY THE PERCENTAGE OF TIME DEVOTED TO INDUSTRIAL MEDICAL PRACTICE

Population of Community	Percent of Time	Number 740	Percent Within Population Group
	10%	1	16.7%
Under 1,000	Less than 10	1	16.7
	0	4	66.6
Total		6	100.0%
	100%	1	1.4%
	80	1	1.4
1,000 - 5,000	40	1	1.4
	20	3	4.2
	10	16	22.2
	Less than 10	36	50.0
	0	14	19.4
Total		72	100.0%
	50%	1	1.5%
	40	1	1.5
	30	1	1.5
5,000 - 10,000	20	4	5.8
	10	16	23.2
	Less than 10	36	52.2
	0	9	13.0
	Not stated	1	1.5
Total		69	100.2%
	70%	1	2.0%
	50	1	2.0
	30	2	3.9
10,000 - 15,000	20	8	15.7
	10	13	25.5
	Less than 10	22	43.1
	0	3	5.9
	Not stated	1	2.0
Total		51	100.1%
	40%	2	6.3%
	30	3	9.4
	20	2	6.3
15,000 - 20,000	10	9	28.0
	Less than 10	14	43.7
	0	2	6.3
Total		32	100.0%
	100%	2	2.5%
	50	1	1.2
	40	1	1.2
	30	3	3.7
20,000 - 30,000	20	7	8.7
	10	17	21.0
	Less than 10	38	46.9
	0	11	13.6
	Not stated	1	1.2
Total		81	100.1%
	90%	1	1.5%
	40	1	1.5
	20	9	13.2
30,000 - 50,000	10	11	16.2
	Less than 10	29	42.6
	0	17	25.0
Total		68	100.0%
	30%	5	12.8%
	20	2	5.1
50,000 - 100,000	10	3	7.7
	Less than 10	18	46.2
	0	11	28.2
Total		39	100.0%
1000,000 - 200,000	10%	2	25.0%
	Less than 10	3	37.5
	0	3	37.5
Total		8	100.0%
	100%	1	1.0%
	90	1	1.0
	80	2	2.0
	50	3	3.0
200,000 - 300,000	30	7	6.9
	20	2	2.0
	10	12	11.6
	Less than 10	35	34.3
	0	39	38.2
Total		102	100.0%

TABLE XVIII — CONT'D.

Population of Community	Percent of Time	Number 740	Percent Within Population Group
	100%	4	2.1%
	80	3	1.6
	50	5	2.7
300,000 and over	40	4	2.1
	30	8	4.3
	20	7	3.7
	10	21	11.2
	Less than 10	62	33.0
	0	74	39.3
Total		188	100.0%
Size of community	100%	1	4.2%
not stated	30	1	4.2
	20	1	4.2
	10	2	8.3
	Less than 10	3	12.5
	0	16	66.6
Total		24	100.0%

TABLE XIX.

LENGTH OF PRACTICE OF RESPONDENTS IN CROSS CLASSIFICATION WITH PERCENTAGE OF INCOME DERIVED FROM INDUSTRIAL MEDICAL PRACTICE

Length of Practice	Percent of Income	Number 740	Percent Within Length of Practice Group
	50%	1	4.4%
	10	6	26.1
Under 1 year	5	5	21.7
	Less than 5	6	26.1
	0	5	21.7
Total		23	100.0%
	100%	3	1.9%
	80	1	0.6
	70	1	0.6
	30	9	5.7
1 - 5 years	20	8	5.1
	10	28	17.7
	5	17	10.8
	Less than 5	37	23.5
	"Very small"	11	7.0
	0	43	27.2
Total		158	100.1%
	100%	1	0.6%
	60	1	0.6
	50	2	1.2
	40	3	1.8
5 - 10 years	30	8	4.8
	20	12	7.2
	10	32	19.2
	5	19	11.4
	Less than 5	40	24.1
	"Very small"	4	2.4
	Not stated	1	0.6
	0	43	25.9
Total		166	99.8%
	100%	1	1.1%
	90	1	1.1
	50	2	2.3
10 - 15 years	40	2	2.3
	30	2	2.3
	20	7	8.0
	10	17	19.3
	5	15	17.0
	Less than 5	21	23.9
	"Very small"	5	5.7
	0	15	17.0
Total		88	100.0%
	100%	1	1.3%
	80	1	1.3
	70	1	1.3
	60	1	1.3
15 - 20 years	40	2	2.8
	30	1	1.3
	20	6	8.0
	10	11	14.8
	5	13	17.3
	Less than 5	18	24.0
	"Very small"	4	5.3
	0	16	21.3
Total		75	100.0%

TABLE XIX — CONT'D.

Length of Practice	Percent of Income	Number 740	Percent Within Length of Practice Group
	90%	1	1.4%
	80	1	1.4
	50	1	1.4
20 - 25 years	30	3	4.3
	20	5	7.2
	10	16	22.9
	5	15	21.4
	Less than 5	14	20.0
	"Very small"	4	5.7
	0	10	14.3
Total		70	100.0%
	100%	2	1.4%
	90	1	0.7
	80	2	1.4
	50	4	2.8
Over 25 years	40	2	1.4
	30	6	4.2
	20	15	10.5
	10	26	18.2
	5	14	9.8
	Less than 5	16	11.2
	"Very small"	16	11.2
	0	39	27.2
Total		143	100.0%
	100%	1	5.9%
	10	1	5.9
Not stated	Less than 5	3	17.6
	"Very small"	1	5.9
	0	11	64.7
Total		17	100.0%

to come in the future, will execute programs of a broader and more productive nature.

Summary

1. QUESTIONNAIRES regarding the practice of industrial medicine were forwarded to 1520 physicians in Oklahoma.

2. Of these, 740 were returned, representing a response of 48.6%.

3. By specialty 43% were in general practice, with the remainder scattered throughout all the other specialty areas.

4. Some teaching in medicine was carried on by 35.7% of the respondents.

5. In consideration of the size of the community where the respondents were practicing, it was noted that 40.3% were practicing in communities of over 100,000 in population, and a little over 50% had been in practice for periods up to 15 years.

6. The most significant figure derived from this study was: 79.5% of the physicians in Oklahoma carry on one or more of the types of industrial medical practice enumerated.

7. In connection with percentage of income derived from industrial medical practice, 75.3% of the physicians replying, accrued anywhere from less than 5% to 100% of the income from this area of the activity.

8. Time-wise, 72.2% of the respondents devoted less than 10% to 100% of their time to industrial medical practice.

9. The industrial connections of these physicians were highest for multiple industries

TABLE XX.

LENGTH OF PRACTICE OF RESPONDENTS IN CROSS CLASSIFICATION WITH THE PERCENTAGE OF TIME DEVOTED TO INDUSTRIAL MEDICAL PRACTICE

Length of Practice	Percent of Time	Number 740	Percent Within Length of Practice Group
	30%	1	4.4%
	10	6	26.1
Under 1 year	Less than 10	13	56.5
	0	3	13.0
Total		23	100.0%
	100%	3	1.9%
	80	2	1.3
	30	9	5.7
1 - 5 years	20	5	3.2
	10	28	17.7
	Less than 10	64	40.5
	0	46	29.1
	Not stated	1	0.6
Total		158	100.0%
	100%	1	0.6%
	50	3	1.8
	40	5	3.0
5 - 10 years	30	4	2.4
	20	12	7.2
	10	31	18.7
	Less than 10	61	36.8
	0	48	28.9
	Not stated	1	0.6
Total		166	100.0%
	100%	2	2.3%
	50	2	2.3
	40	1	1.1
10 - 15 years	30	3	3.4
	20	5	5.7
	10	13	14.8
	Less than 10	44	50.0
	0	18	20.4
Total		88	100.0%
	100%	1	1.3%
	80	1	1.3
	70	1	1.3
15 - 20 years	50	2	2.7
	40	1	1.3
	30	1	1.3
	20	6	8.0
	10	11	14.7
	Less than 10	32	42.7
	0	18	24.0
	Not stated	1	1.4
Total		75	100.0%
	90%	1	1.4%
	80	1	1.4
	50	1	1.4
20 - 25 years	30	2	2.9
	20	4	5.7
	10	13	18.6
	Less than 10	35	50.0
	0	13	18.6
Total		70	100.0%
	100%	1	0.7%
	90	1	0.7
	80	2	1.4
Over 25 years	50	3	2.1
	40	3	2.1
	30	8	5.6
	20	13	9.0
	10	21	14.7
	Less than 10	44	30.8
	0	47	32.9
Total		143	100.0%
	100%	1	5.9%
Not stated	30	2	11.8
	Less than 10	4	23.5
	0	10	58.8
Total		17	100.0%

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TABLE XXI.
PERCENTAGE OF INCOME DERIVED FROM INDUSTRIAL MEDICAL PRACTICE BY TYPE OF INDUSTRIAL MEDICAL PRACTICE OF RESPONDENTS

Percent of Income	Full-time	%	Part-time	%	Consultant on call	%	Consultant in office	%	P. E. in office	%	Injuries in office	%	Other	%
100%	5	41.7	1	4.6	2	1.4	1	0.4	5	1.4	5	1.0		
90%	1	8.3	1	4.6					2	0.5	2	0.4		
80%			1	4.6	3	2.2	4	1.5	5	1.4	5	1.0	3	2.9
70%	1	8.3	1	4.6	1	0.7	2	0.7	2	0.5	2	0.4		
60%							2	0.7	2	0.5	2	0.4	1	1.0
50%			3	13.7	7	5.0	6	2.2	6	1.7	9	1.9	2	2.0
40%					4	2.9	5	1.8	8	2.2	9	1.9	3	2.9
30%			2	9.0	16	11.4	21	7.6	20	5.5	24	5.0	3	2.9
20%			4	18.2	12	8.6	28	10.2	35	9.7	49	10.2	14	13.7
10%	1	8.3	4	18.2	36	25.7	65	23.6	93	25.7	120	25.0	24	23.6
5%	2	16.7	2	9.0	18	12.9	49	17.8	63	17.4	85	17.7	14	13.7
Less than 5%			1	4.6	24	17.1	57	20.7	70	19.4	106	22.0	19	18.7
"Very small"					8	5.7	15	5.5	26	7.2	36	7.5	6	5.9
0	2	16.7	2	9.0	8	5.7	19	6.9	24	6.6	26	5.4	13	12.7
Not stated					1	0.7	1	0.4	1	0.3	1	0.2		
Total	12	100%	22	100%	140	100%	275	100%	362	100%	481	100%	102	100%

TABLE XXII.
PERCENTAGE OF TIME DEVOTED TO INDUSTRIAL MEDICAL PRACTICE BY TYPE OF INDUSTRIAL MEDICAL PRACTICE OF RESPONDENTS

Percent of Income	Full-time	%	Part-time	%	Consultant on call	%	Consultant in office	%	P. E. in office	%	Injuries in office	%	Other	%
100%	6	50.0	1	4.6	1	0.7	1	0.4	4	1.1	4	0.8		
90%			1	4.6					2	0.5	2	0.4		
80%	1	8.3	1	4.6	3	2.2	5	1.8	6	1.7	6	1.3	3	2.9
70%			1	4.6	1	0.7	1	0.4	1	0.3	1	0.2		
60%														
50%			2	9.1	7	5.0	9	3.3	8	2.2	10	2.1	4	3.9
40%			1	4.6	4	2.9	3	1.1	8	2.2	10	2.1	1	1.0
30%			2	9.1	16	11.4	21	7.6	21	5.8	26	5.4	4	3.9
20%	1	8.3	5	22.7	13	9.3	26	9.4	35	9.7	41	8.5	12	11.8
10%			2	9.1	34	24.3	56	20.3	85	23.5	111	23.1	22	21.6
Less than 10%	2	16.7	3	13.5	51	36.4	125	45.5	162	44.8	229	47.6	44	43.1
0	2	16.7	3	13.5	9	6.4	27	9.8	28	7.7	39	8.1	12	11.8
Not stated					1	0.7	1	0.4	2	0.5	2	0.4		
Total	12	100%	22	100%	140	100%	275	100%	362	100%	481	100%	102	100%

(35.7%); second in frequency was the petroleum industry (12.7%).

10. Of these completing the questionnaire, 430 returned the attached coupons, stating that they wished to be advised of new opportunities in industrial medicine.

11. Cross-classifications wherein income data, specialty designation, time information, community populations, etc., are studied, may be found in the text.

Conclusions

1. A GREATER percentage of physicians practice industrial medicine than a casual inquiry would indicate.

2. Were it possible to convert the percentage of income figures into monetary values, it would be found that a substantial income accrues to most medical practitioners from their connections with referring industrial organizations.

3. These data should be made known to the undergraduate medical student so that greater meaning can be attached to the training program in occupational medicine at that period of his schooling when, to him, his future participation in this specialty seems remote.

Addendum

SURVEYS frequently reveal feelings held by the respondents, and some of the comments made under "Remarks" are of interest:

1. "I do not like, and therefore do not do industrial work."

2. "Industrial work of any kind is good work

and well paid. It also opens up new facets for private practice."

3. "Derive more satisfaction from industrial service."

4. "Industrial work involves too many reports unless one sets up an office routine for volume."

5. "Industrial medicine is a very satisfactory phase of medical service. It is different from the usual type because of the interest of the third party and the legal aspects."

6. "I have no industrial affiliation but treat eye injuries received by local workers. There is a big field for educating general doctors not to try to treat eye injuries and in instructing workers to have prompt treatment."

7. "I agree that Oklahoma needs more trained industrial doctors. Post-training courses in industrial dermatoses, that I have had, indicate that most of our training is deficient in this."

8. "More power to you."

9. " I would be interested in doing industrial work under insurance compensation plan or under employer furnished plan, but not under union control."

10. "I only take care of one small company employing about eight men. Owner is a personal friend."

11. "Industry is a scarce commodity in most sections of Western Oklahoma. The M.D.'s and the communities would gain much from new industry."

12. "Your course should definitely include how to figure and evaluate disability compensation."

13. "Please teach this — how to treat back 'sprains,' 'aches,' etc."

14. "Interested in correct evaluation of percentage of residual disability."

15. "My patients in industry should be cared for by me."

16. "I am aware of the fact that industry requires physicians with special industrial training, and that when more physicians with adequate training are available to industry, there will be fewer lawsuits for recovery of damages, especially phony suits, arising from either incompetent handling of cases, or by falling into the hands of unethical physicians, lawyers, or worse, combinations of both."

17. "I definitely feel industrial medicine has a place in the curriculum. I feel the students should be acquainted with the Industrial Commission, its activities, and the general procedures of reporting care of industrial injuries, as well as some training in the evaluation of disability."

[ACKNOWLEDGEMENT is expressed to DR. THRIFT G. HANKS for the basic idea of a state survey of this type, and to BOBBIE HURT for the compilations and assistance in the preparation of the manuscript.]

Imagination

IMAGINATION is wonderful, so long as it is kept under control. A small boy can become Ted Williams within a second and a tiny girl may live like a princess when she starts daydreaming. But imagination is a two-way road that can lead to unpleasant and terrorizing experiences. We have all heard stories of natives who collapsed shortly after a voodoo rite. Whether death was due to terror is a moot question; it is conceivable that some had heart attacks. Dr. James Householder passed along the following story: A railway employee entered a refrigerator car and the door slammed shut. He was found dead several hours later but had written a short account of his sensations on the wall. He included the details of how cold he felt and what was happening while he slowly froze to death. His last remark was: "I'm going to close my eyes now and die." An investigation disclosed that the boxcar was not airtight and the temperature inside had never gone below freezing. This man died of an overactive imagination. I have witnessed related phenomena in hospitals when an extremely ill patient decides to give up. The course of the disease from that moment is downhill and the end comes within a day or two. Imagination is not wholly responsible, because these patients are critically ill to begin with: On the other hand, I have seen equally sick persons who refused to lose hope, Luke, the beloved physician apostle, said: "Thy faith has made thee whole."

—From "How to Keep Well," by T. R. VAN DELLEN, M.D., in *Chicago Sunday Tribune*, September 15, 1957.

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Fatal Pulmonary Disease Caused by an Atypical Acid-Fast Bacillus

—*a bacteriologic and clinical study*

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REPORTS describing atypical acid-fast bacilli isolated from the sputum of persons with progressive, fatal pulmonary disease are being published with increasing frequency.[1,2,3] This paper is concerned with the study of such an atypical acid-fast bacillus, designated as Strain *G*, repeatedly grown from the sputum of a patient who, clinically and roentgenographically, had far-advanced silicosis combined with tuberculosis, from which he subsequently died. The organism proved avirulent for guinea pigs, rabbits, mice, hamsters, and chickens and was identified as a nonphotochromogen according to the criteria for classification of atypical acid-fast bacilli.[4]

The subject, G. G., a white male, age 46 years, was studied at the Will Rogers Memorial Hospital, Saranac Lake, New York. During the period 1930 to 1947, he had been employed in a stone works as a cutter, polisher, and sand blaster. Thus his potential exposure to dust was a period of 17 years. In March, 1947, he sought medical advice for dyspnea, cough, fatigue, and loss of weight. An initial roentgenogram of his chest revealed silicosis. Upon advice to discontinue his job in the stone works, he obtained employment as a projectionist in a drive-in theater. In August, 1949, another chest x-ray film disclosed marked nodular silicosis throughout both lungs without evidence of superimposed infection. No clinical record is available for the period from September, 1949, to August, 1952. In September, 1952, the patient again sought medical advice, stating that he had experienced hemoptyses in June and July of the same year. Radiographic examination of his lungs now revealed lesions identified as silicotuberculosis.

On admission the patient did not appear acutely ill, but was underweight (118 lbs; height, 6 ft.). Intracutaneous skin tests with 1:1000 and 1:100 Old Tuberculin were negative. He also yielded negative responses to Histoplasmin and Coccidioidin. A chest roentgenogram (Fig. 1A) revealed numerous discrete nodules throughout both lungs. The right pulmonary field above the level of the fourth rib anteriorly showed dense infiltration with cavitation, confirmed by planigraphy. In the left lung above the first rib, anteriorly there was an area of dense infiltration.

On repeated microscopic examination the sputa were found to contain moderate numbers of solidly staining acid-fast rods which resembled typical tubercle bacilli except that coccoid forms predominated. On the assumption that the condition was an aberrant form of tuberculosis, the patient was subjected to bed rest and chemotherapy was started on October 18, 1952, with daily doses of Streptomycin, 1 gram, and Isoniazid, 300 mgs. Apart from a gain of five pounds in weight, no significant improvement was achieved.

Contrary to medical advice, the patient returned to his home in North Carolina on November 30, 1952, where his health was supervised by Dr. W. L. McLeod until December 17, 1953, when he was hospitalized under the care of Dr. William Chew, of the Gravely Sanatorium, Chapel Hill, North Carolina. The chest roentgenogram at that time disclosed that the dense conglomerate lesion previously present in the right upper lobe had become replaced by a large cavity. In the right hilar region there was increased infiltration, with deviation of the trachea to this side. In the left lung there was no significant change in the nodular infiltration. Dr. H. MacVandiviere, Director of Laboratories and Research at the Gravely Sanatorium, reported microscopic and cultural findings of the acid-fast organisms present in the sputum similar to the findings at the Will Rogers Memorial Hospital.

The condition of the patient deteriorated, and he returned to the Will Rogers Memorial Hospital on April 19, 1954. The chest x-ray film on admission revealed a huge cavity in the right upper

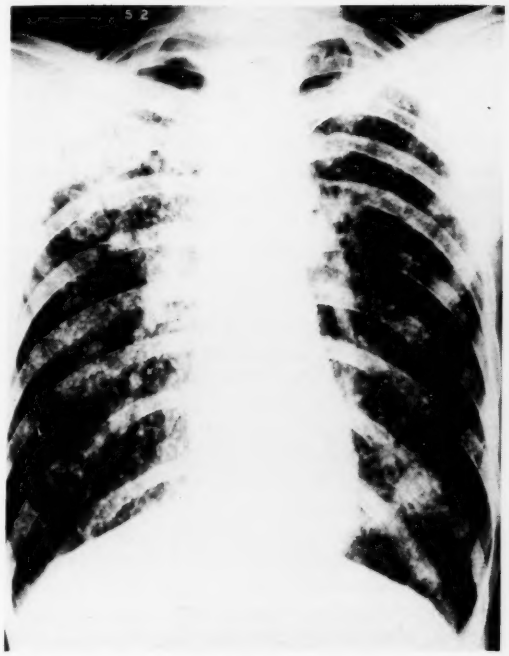

Fig. 1A.
Teleradiograph of G. G. taken October 7, 1952, on admission to Will Rogers Hospital. The salient features include generalized small and medium silicotic mottling, some foci being calcified. The right upper lobe is occupied by a dense infiltrative process interpreted at that time as silicosis with tuberculosis.

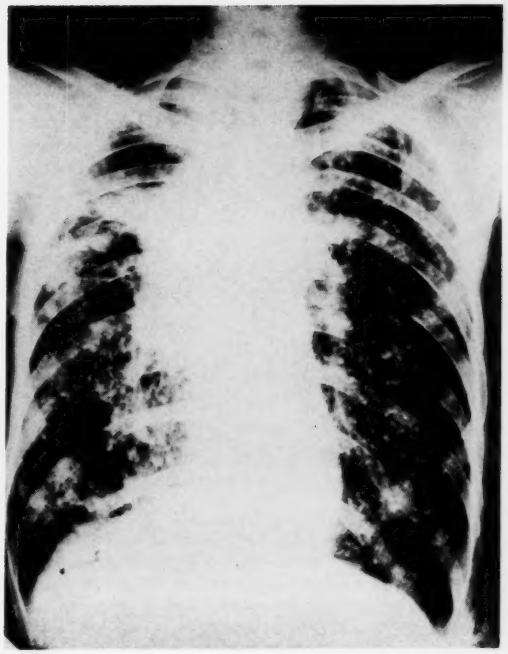

Fig. 1B.
Teleradiograph of G. G. taken October 30, 1954, immediately prior to leaving the hospital. At the right apex a giant cavity and in the right para-aortic region massive infiltration with deviation of the trachea are displayed. The increased prominence of the generalized mottling in the left lung is due partly to calcification. The infection in the right lung progressed in spite of continuous chemotherapy and bed rest.

lobe and immediately beneath it there was a second smaller cavity. There was no significant change on the left side. He now had a marked cough with profuse foul sputum. The smears of the sputum exhibited acid-fast organisms varying from Gaffky II to VI. Direct inoculation of the sputum into guinea pigs produced no disease. In spite of continued bed rest for eight months and Terramycin therapy for secondary infection, chest x-ray films taken on December 8, 1954, revealed the formation of an additional cavity in the right lung while the original cavities remained unchanged (Fig. 1B).

Unsatisfactory family conditions at home once more caused the patient to leave the hospital on December 26, 1954. Realizing the poor prognosis in this case an attempt was made to arrange for necropsy. Permission was not granted. Six weeks after he reached his home, his physician reported that he had died, apparently from right heart failure.

Bacteriologic and Biologic Characteristics

EVERY concentrated smear of the sputum of the patient contained acid-fast rods about two microns in length. These bacilli resembled the *Mycobacterium tuberculosis* closely. The bacillary content of the concentrated smears ranged from Gaffky I to VI. Approximately 60% of the smears were Gaffky II. Growth of the organisms from the sputum was readily obtained on inspissated egg medium (ATS) at 37° C at the end of three to four weeks. Smears from the subcultures often showed curved and beaded bacilli up to six microns in length (Fig. 2A), and these were often joined in a racemic pattern. The individual colonies were of a light cream color, small, circular, raised, soft, and glistening. As the culture aged there was a tendency for the individual colonies to fuse.

Exposure of the growing cultures to light did not produce pigmentation. This finding permits classification of the organism as a nonphotochromogen.[4] The organisms also were grown on inspissated egg medium (ATS) at room temperature (21° to 23° C). Small colonies, up to 2 mm in diameter, appeared at the end of six weeks. A sparse growth of the organisms was also obtained at the end of two months at 37° C on blood agar, nutrient agar, and Saboraud's agar. These growths consisted of nonpigmented pin point colonies. No growth occurred in infusion broth. The colonies were easily miscible in saline and in other aqueous diluents. Profuse growth was obtained on Dubos' liquid albumin Tween 80® at the end of 10 days. The sediment

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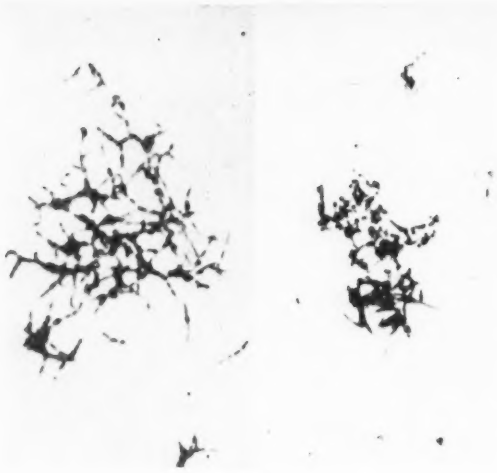

Fig. 2.

Fig. 2A (left) G Strain atypical acid-fast bacilli recovered during life from the sputum of silicotic subject G. G. Organisms grown on standard A.T.S. inspissated egg medium were streptobacillary branched and beaded pleomorphic forms (Ziehl-Neelson stain; X 1700). Fig. 2B (right) Demonstrates lack of cord formation and dominance of short rods and coccal forms when G strain atypical acid-fast bacilli were grown on Dubos' liquid medium containing 0.5% of human serum (Ziehl-Neelsen stain; X 1700).

was not colored. No cord formation was observed in the Dubos' liquid medium containing human serum (Fig. 2B). None of the organisms from all the cultures which were tested was capable of binding neutral red. They all showed marked catalase activity. The first suggestion that this organism might be an atypical acid-fast bacillus was indicated when it was discovered that prior to chemotherapy the bacilli were resistant to 100 mcgm per ml of Streptomycin, to 100 mcgm per ml of Para-aminosalicylic acid and to 10 mcgm per ml of Isoniazid.

Animal Virulence Studies

GUINEA PIGS. Thirty-eight guinea pigs were inoculated by different routes with varying amounts of the organisms. Transitory infection was limited to the sites of inoculation and in no instance was progressive disease observed. Varying degrees of skin hypersensitivity were elicited in the inoculated animals by means of 0.1 mg of 3% Old Tuberculin given intracutaneously. Twelve guinea pigs were inoculated subcutaneously in the right flank area with 1 mg of the organisms. Half of the animals were killed at three months and the remainder at five months. Intracutaneous skin tests with 0.1 mg of 3% Old Tuberculin were made at one, two, and four months after infection. The skin reactions were limited to induration with ischemia (Table I). Of the six animals killed at the end of three months, three exhibited small subcutaneous caseous abscesses at the site of inoculation with moderately enlarged inguinal lymph nodes. There was no evidence of infection in the remaining three animals. Of the six animals killed at five months, only one animal had a caseous abscess at the site of inoculation; the remainder showed no evidence of infection. Smears from the caseous abscesses showed acid-fast rods which yielded growths similar to the inoculated cultures.

In addition, 10 animals were inoculated intracutaneously with 0.1 mg of the organisms. The infection was limited to the draining lymph nodes. Intracutaneous skin tests made with 0.1 mg of 3% Old Tuberculin, six weeks after inoculation, produced superficial necrosis in two of the animals. In the remainder, induration only resulted while a negative reaction was obtained in one animal.

Six animals were inoculated intracardially with 0.1 mg of bacilli. Pairs of the animals were killed at one, two, and three months after infection. The disease was limited to the hepatic lymph nodes. At one month this node was moderately enlarged and firm, but was smaller at the end of the second and third months. There was some roughening of the surface of the liver at one month but this organ appeared normal in the later necropsies (Table II).

Ten additional animals were inoculated by the

TABLE I.
SKIN HYPERSENSITIVITY ELICITED BY 0.1 MG OF 3% OLD TUBERCULIN INJECTED INTRACUTANEOUSLY IN GUINEA PIGS INOCULATED WITH THE G STRAIN OF ATYPICAL ACID-FAST BACILLI

Number of Animals	Route of Inoculation	Size of Inoculum	Degree of Skin Sensitivity — Number of Animals				
			0	1+	2+	3+	4+
12	Subcutaneous	1 mg	0	6	3	3	0
10	Intracutaneous	0.1 mg	1	5	2	0	2
8	Intracardiac	0.1 mg	0	0	0	4	4
10	Inhalation	Heavy suspension Aerosol	0	8	1	1	0

Key:
0 — No reaction.
1+ — Induration less than 10 mm diameter.
2+ — Induration greater than 10 mm diameter.
3+ — Induration with ischemia.

TABLE II.
NECROPSY FINDINGS IN GUINEA PIGS INOCULATED WITH THE G STRAIN OF ATYPICAL ACID-FAST BACILLI

Number of Animals	Route of Inoculation	Size of Inoculum	Severity of Response			
			No Evidence of Infection	Limited to Lymph nodes	Progressive Disease	Fatal Disease
12	Subcutaneous	1 mg	8	4	0	0
10	Intracutaneous	0.1 mg	6	4	0	0
8	Intracardiac	0.1 mg	0	8	0	0
10	Inhalation	Heavy suspension Aerosol	8	2	0	0

inhalation route. These animals were killed four, five, six, eight, and 10 months after inoculation. When sacrificed at four and five months periods, evidence of infection was limited to enlargement of the tracheobronchial lymph nodes. At six months and at subsequent bimonthly necropsy examinations the tracheobronchial lymph nodes were normal and there was no other evidence of disease. The degree of reaction to the intracutaneous skin test with Old Tuberculin was less than that observed in the animals infected by the intracutaneous route.

The 20 guinea pigs inoculated by the intracutaneous and inhalation routes also served as the controls in an experiment[5] in which these atypical acid-fast organisms were similarly inoculated into silicotic pigs. The results of these studies will be reported separately.

CHICKENS. The smoothness and pasty consistency of the growth, especially on subcultures made on the inspissated egg medium (ATS), suggested the possibility of an avian strain of the tubercle bacilli. Therefore, two chickens (Rhode Island Reds) were inoculated intravenously with 1.0 ml of a nine-day heavy growth of the organism in Dubos' liquid albumin Tween 80 medium. Both chickens were killed 53 days after infection. No evidence of gross tuberculosis was found in the chickens.

MICE. Three mice, Strain DBA-1, obtained from the Jackson Memorial Laboratory, Bar Harbor, Maine, were inoculated intravenously (tail vein) with 0.2 ml of an 0.85% NaCl solution containing 0.5 mg of the organisms.. No evidence of gross tuberculosis was seen at the end of two months.

HAMSTERS. Four hamsters were used. Pairs of the animals were inoculated subcutaneously in the right groin with 5 mg and 0.5 mg of the organisms respectively. Two of the animals, one infected with the larger and the other with the smaller dose, were killed two months after injection. The remaining two were killed four months after injection. There was no ulcer at the site of inoculation in any of the animals. The infection caused enlargement of the right inguinal lymph node with slight enlargement of the right iliac lymph node. These lymph nodes were smaller at four months than were those observed two months after injection.

RABBITS. Two rabbits were inoculated intravenously with the organisms. One rabbit received 0.01 mg and the other 1.0 mg of the organisms suspended in 0.85% NaCl solution. Both animals were killed two months after infection. No evidence of gross tuberculosis was found.

Comment

THE ATYPICAL acid-fast bacillus isolated from the sputum in this case of infective silicosis can be differentiated from the *Mycobacterium tuberculosis* by virtue of lack of pathogenicity for the guinea pig, cultural characteristics, marked resistance to the antituberculous drugs prior to therapy, inability to form cords, and negative neutral red reaction. The cultural and nonpathogenic characteristics conform in many respects to those of a group of 64 atypical, avirulent, nonphotochromogenic, acid-fast strains isolated from patients with pulmonary disease described by Crow and his associates.[1] Silicosis was not mentioned as a complicating disease in any of these patients. The importance of the present strain lies in the fact that it was recovered from a silicotic subject. Atypical acid-fast bacilli only once previously have been reported in a victim of silicosis.[6] This bacillus which was isolated by Feldman and his associates, proved to be avirulent for guinea pigs, but did have a relatively low but definite pathogenicity for rabbits.

Acid-fast tubercle bacilli of low virulence may cause progressive pulmonary disease by virtue of specific factors which lower host resistance. Gardner[7,8] in 1929 first demonstrated conclusively that the attenuated *RiRv* strain of the human-type tubercle bacillus produced progressive and fatal pulmonary disease in guinea pigs exposed by inhalation to particulate silica. Policard[9] also showed the same property in a strain of the *BCG* bacillus in silicotic animals. Vorwald and his associates[10,11] at the Saranac Laboratory employing the Tice and Phipps strains of *BCG* organisms confirmed the findings of Policard.

It must be noted that progressive pulmonary disease in the presence of experimentally induced silicosis has been achieved only with attenuated forms of previously virulent organisms. Tubercle bacilli of the avirulent *H37Ra* strain and of the nonpathogenic *M. marinum* type fail to accomplish such effects.[11] We must consider the possibility, therefore, that atypical acid-fast organisms which produce progressive pulmonary disease in silicotic animals may originally have been virulent tubercle bacilli.

The present bacillus is important because it is classifiable as an atypical acid-fast bacillus and not as a *Mycobacterium tuberculosis*. This raises the whole issue of whether infective tuberculosis may be caused by bacilli other than the tubercle bacillus alone. This issue has been further explored experimentally in silicotic guinea pigs[5] with respect to the present strain *G* and also with reference to another strain *R* of atypical acid-fast bacillus recovered from a silicotic subject.[12]

Summary

A NONPHOTOCHROMOGENIC atypical drug resistant acid-fast bacillus was isolated from the sputum of a patient who, clinically and roentgenographically, had far advanced silicotuberculosis from which he subsequently died. The strain was avirulent for normal guinea pigs and

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was incapable of causing progressive disease in fowls, mice, rabbits, and hamsters. The clinical course of the patient and the bacteriologic characteristics of the bacillus are reviewed.

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Contrasts

Bill Johnson, an executive, came to the Medical Department for an examination in May, anticipating retirement in September. He had no complaints which would have taken him to his family physician. The examining physician discovered a cancer of the lung. The employee ceased work, was successfully operated on, and is now enjoying his retirement five years later. The Medical Department deliberately added four months' loss of time to sickness absenteeism costs. The result is a live rather than a dead annuitant. The most critical cost-minded manager will not take exception to this type of burden expense. These are the sorts of cases the "plans" people had in mind when they conceived the liberal sickness absenteeism policies which now prevail. These are not the types of cases we have in mind when we try to reduce sickness absenteeism costs. In contrast, in Susie Jones' 11 years' employment, she has been absent ostensibly because of sickness 66 times and has lost 371 days from the job. This averages 6.6 absences totaling an average of 34 days each year. A glance at the record indicates that her absences present a pattern which is repeated year in and year out. No coronaries or cancers here! The absences are for "nervousness," "headache," "dysmenorrhea," and the like. One doesn't need a physician to recognize that this record is not compatible with productive employment. These specific examples point up the need for individual evaluation of sickness absenteeism "patterns" of individual employees. On casual inspection of the record, many employees or groups of employees will be found to present such a grossly different pattern of absenteeism from the majority of their associates that it may be immediately recognized as "abnormal."

—From "A Human Relations Approach to Sickness Absenteeism and Other Employee Problems," by Leo Wade, M.D., Medical Director, Esso Standard Oil Company, in *AMA Arch. Indust. Health*, December, 1955.

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Medical Aspects of Automation

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THE LONG-RANGE scope of the development of automation includes problems in demography, geriatrics, the educational system, the security of the home and the sanctity of the family, and, most of all, the dignity of the individual.

The short-range scope has to do with the medical problems of anxiety and frustration of the worker who thinks he is threatened with unemployment or displacement from employment by mechanical monsters.

What is automation? How did it develop? What will it accomplish?

THE TERM "automation" was coined in 1945 by Dell Harter, of the Ford Motor Company. It means "continuous automatic production" — "the use of machines to run machines." More exactly, it is "a system of production by automatically-controlled machines which carry out complex movements formerly performed by lever-operated or power-driven machines, or by hand. Electronic devices called 'feed-backs' control these machines and send back information to the controllers, who then, by remote control, make changes or adjustments in the production process."

Automation is the product of the initiative of an intelligent being. It had its origin when prehistoric man developed the adaptation of the opposing thumb and forefinger, and coupled to that his mind and imagination. Then man learned to use a lever; then an inclined plane; then he made a wheel. Continuing, he made more complex machines; applied these machines to mass production; and now he is refining his machine tools so that they can almost think. All of this with the two assets — anatomical and psychological: the thumb and forefinger, the mind with its imagination and initiative. Automation is, therefore, but a step in technological progress; it is a fabric of many strands, started long ago and still on the loom.

Among the accomplishments we may expect from automation are:

1. An increase in the gross national productivity.
2. A production process with less danger, less drudgery, less dullness.
3. More satisfying work at higher pay for higher skills.
4. Development of auxiliary service industries, creating more employment.
5. A rise in the standard of living, by creation of new products.
6. A stabilized economy, and stabilized employment.

Automation has been hailed as the greatest advance since the introduction of the mass-production method. It means changes in the methods of industry.

Change usually is met with resistance — mainly by workers because they fear the loss of their source of livelihood. This is not new. With the advent of the industrial revolution in 1768, weavers welcomed the multiple-spindle machines by smashing the apparatus.

That attitude has not improved. Labor assumes that automation means widespread unemployment, and voices sharp criticism of innovations due to it.[1]

On the other hand, industrialists claim that automation will have salubrious effects, owing to the beneficial changes it will bring.

Ralph J. Cordiner,[3] President, General Electric Company, points out that in adjusting to technological change, seldom is a person put out of work by improvement: "We try to plan any substantial changes in such a way that the normal attrition of our work force — the people who quit, retire, or die — will absorb the shift in employment. The factor of normal employment turnover has not been adequately appreciated in most discussions of automation. In the past 12 months, General Electric has hired about 40,000 new employees to replace those who quit, died, or retired, or whose employment terminated for reasons other than lack of work. In the same period, at least 30,000 of our employees changed jobs within the corporation, because of promotions, technological changes, and the normal internal shifts of the work force due to lack of work in one area. This is how industry generally takes care of the short-term adjustments. Naturally, the company provides any training required to enable employees to handle new job assignments. Most of this is of informal nature, and is done by the supervisors on the job, or through

Presented at a Meeting of the American Society of Training Directors, Los Angeles Chapter, April 25, 1957.

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vestibule training schools that run from one to two weeks in preparation for a specific kind of work. In addition, our company conducts more than a thousand courses in factory skills, and at least 500 courses at its various locations for professional, technical, and semitechnical personnel in the areas of finance, manufacturing, engineering, supervision, management and marketing. We estimate that we spend 35 to 40 million dollars a year to train and retrain our employees."

This outstanding industrialist also says:

"There are four sources of new employment that arise from automation and technological change:

"First, technological progress sets off a sort of chain reaction of economic growth; more productive machines reduce costs and prices; this increases the volume of business, creating a need for more employees.

"Second, the service industries provide new employment. In 1947, the purchase of services accounted for 31 cents of the consumer's dollar. Today, the figure is 36 cents — up 16% in eight years. Technological progress creates more leisure and wealth for cultural and educational activities. Hobbies, sports, travel, and retail trade are increasingly important sources of employment.

"Third, the industries supplying automation and technological advance also create new employment opportunities, i.e., the employment involved in designing, selling, building, and installing the new machinery and the controls, along with the new buildings required. Further, there is the additional employment required to maintain and service the equipment after it is installed.

"Fourth, entire new industries, employing thousands, are created by the new automation technologies."

Some examples of this are:

The *electrical power industry* — which is highly automatized and has been developed within the lifetime of persons now living — employs 395,000 persons; but the industry has developed employment for six and a half times that number — 2.6 millions of jobs in electrical distribution, manufacturing, contracting, and the wholesale and retail trade fields.

The *polyethylene* industry, also highly automatized — a brand-new industry, the result of chemical and physical research — has many health hazards from high pressures and high temperatures. Automation has enhanced the safety and comfort of its workers.

The *electronics* industry has developed computers that can do 40,000 additions per second. One computer can do in an hour the work of one clerk working 164 years. An army of clerks would have been occupied for decades in the work required for the development of atomic power. It is fantastic to contemplate what these computers may be able to do in scientific and business analysis, in accounting methods, and in communications systems.

EMPLOYMENT will be stabilized by automation because it is apparent that it can be applied best to those industries where there is little fluctuation in the level of production, and where the production process is continuous for a long time — even for years. Further, employment will become stabilized in automatized industries because of the great capital investment per worker. In the highly automatized chemical industry, the capital investment per worker in 1954 was $26,000, twice the amount in industry as a whole. In the electrical power industry, it is in excess of $106,000. Such resources cannot be allowed to become idle or incapacitated. Thus, automation will not cut down the total number of people employed — just as mass production did not do so. From what we can see, the total work force does not shrink; on the contrary, it tends to expand. But automation requires totally different workers who are actually much closer to the professional and technical specialist. This creates a problem of managing people that is quite different from any personnel management problem with which most businessmen are familiar.

At the turn of the century, the problem was to adapt unskilled and semiskilled labor into skilled labor. At the half-century mark, the problem is to upgrade workers into skilled technicians, planners and engineers to operate, control and apply these new delicate and complicated machines to the vast problems of tomorrow. This brings up the dilemma of the training director and personnel director — to find these highly trained persons. This is intimately tied up with vital statistics, and, because that has some medical implications, let us digress on a short excursion into the spheres of demography, geriatrics, and education.

WE ARE undergoing a population explosion. Demographers estimate that our population will have increased by about 100% by the year 2000.[8] The population now is increasing at the rate of 1.6 persons per second. During the time of this discussion 6,000 new souls will have been born into the world.

In 1956, for the first time, the life expectancy of a newborn has exceeded 70 years.[15] From Metropolitan Life Insurance statistics we learn that in the present century, life expectancy has increased 40%. From this alone, we can foresee that the geriatric factor will be an element to be reckoned with in every phase of the social and economic order.

In order to maintain our standard of living

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today, 41% of the population is in the labor force; there are 65 million workers. If we are to keep this standard of living, 90 million workers will be needed in 1976. It has been estimated that by 1965 there will be a 40% increase in the demand for goods, but only a 14% increase in the labor force. A major cause for this shortage is the low birth rate following the great depression and during World War II. Although there was a marked acceleration in the birth rate after the war, these babies will not enter the labor market until about 1975. All of this means that there will be a great demand for goods and services from a limited number of workers for about two decades.

From the examples of industries cited, it is obvious that the type of worker required to man an automatized industry must, of necessity, come into the classification of either skilled or highly skilled. The ordinary worker, relieved of the dirty, back-breaking jobs, unpleasant working conditions, and the repetitive highly-specialized tasks commonly found on the assembly line, must be prepared to fill the requirements for technical jobs such as maintenance and repair of machinery, engineering design, supervision. On the higher level, the demand will be for persons who can understand mathematics, chemistry, physics, electronics, nucleonics, in order to maintain and operate the new complex devices of production; and, most importantly, for managers who have the ability to think, and possess the imagination to envisage the possibilities of the applications of these new methods. Especially will there be a need for scientists and engineers.

Dr. G. T. Seaborg, California Institute of Technology,[14] states, "Half the American public schools offer no foreign language at all, and one-quarter teach no physics, geometry, or chemistry. Students get less and less contact with the basic fields of science. . . . and if later they do develop an interest in science, they find that their high school preparation is inadequate to permit them to elect a science or professional major field of study in college."

Proof of the lack of adequately trained engineers and technicians, is found daily in the newspaper advertisements and the radio programs pleading for trained brains to come to work at this or that plant.

A major consideration of the adaptation of the worker to automation is also a philosophical one. It is a perplexing problem as to what will happen between now and 1984, when, in the presence of an automatized economy, the army of the postwar population boom and legions of oldsters will have marched upon the scene. How to maintain the identity of the individual and his social satisfaction when these two widely divergent elements of population converge simultaneously upon the social and economic plateau, without upsetting the status quo, constitutes a sizable poser in political philosophy.

UP TO THIS point, I have tried to sketch some long-range aspects of automation, and such factors as vital statistics, public health measures producing increased longevity, geriatric problems, population explosion, and the apparently inadequate education program.

The transition to an automatized economy apparently implies to the worker a threat of mass-employment displacement, a threat to his financial security, fear of loss of prestige due to job-reassignment, loss of pride in craftsmanship, inability to adapt to a new situation. All of these tend to produce uneasiness — dis-ease, if you will.

It is my impression that the medical problems in an automatized industry will not be different in kind from those that have been present right along. The emphasis will become greater in the field of functional disorders and emotional adjustments — especially in the transition period, during which the workers may anticipate a large-scale job displacement. The emphasis will be less upon the problems of injuries, traumatic surgery, and environmental hazards. For example, the Ford Motor Company has reported a reduction of 85% in the incidence of hernias after automatic equipment was installed to handle heavy stock.

Automation will greatly improve the environment wherein work is done, and increase the safety factors. Remote control will remove the worker from many noxious chemical and physical agents. Frequently, the necessities of a particular operation keep the dust levels lower than are specified for the good health of the employee. Often a manufacturing process requires that ventilation, temperature, noise, and humidity be rigidly controlled, not only because of regard for the worker, but because this is dictated by the demands of the procedures.

THE MEDICAL problem, then, is more psychological than physical. The anxiety of the employee in this period of transition into automation is closely allied to his health and well-being, and anticipation of this must be taken into account. Where employee and job are ill-matched, work will not be a source of satisfaction; tension and stress in the employee will be the result. A company's employees are one of its most valuable assets, and automation will accentuate this fact. It must always be borne in mind by management and made clear to the employee that automation will not constitute a cataclysmic change, but rather an evolutionary development.

Because of the higher caliber of worker that will be required, and the cost of training him, each employee will represent a much larger capi-

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tal investment than heretofore. Errors in judgment on the part of the employee, as well as errors on the part of management in his selection, can prove too costly. Therefore, industrial psychiatry, health counseling, selective placement, through evaluation of the applicant's physical and mental condition, must become the prime responsibilities of the managerial setup.

Since the overwhelming problem, therefore, is one of interpersonal relationships, where shall we turn for its solution? The answer is, we must turn to the training directors, the personnel managers, the industrial physicians.

The keystone to the solution is the achievement of emotional maturity.

It is estimated that 20% of all employees in peacetime are borderline emotional cases, unable to bear the stresses of their work. This leads to loss of efficiency while the worker is on the job and not feeling well, and to increased absenteeism.

In England, in studies by Dr. Russel Fraser in 1955,[5] it was shown that from one-third to one-fourth of the absenteeism in industry was caused by nervous disorders.

In France, from studies of the Institute of Preventive Medicine in Lyon, Dr. J. Koekebakker[9] reported a definite relationship between the high rate of illness within the industry, and the high degree of disharmony between the workers and the supervisors and managers.

In America, Dr. William J. Fulton, of General Motors, found that only 30% of the industrial population caused 80% of the consultations in the industrial Medical Departments, and these were primarily functional disorders. It is interesting that these data are consistent in different nations.

Fear and anxiety are the bases for many of these emotional maladjustments, and the resultant emotional tensions may lead to compulsory drives and aggressiveness (the 'Oh Yeah!' attitude), or to recession and withdrawal from responsibility (the 'Oh, what the H - - -!' attitude). On the job this situation may become manifest by such symptoms as preoccupation with some personal concern leading to social isolation and change in living and working habits; impairment in memory and concentration; increased self criticism; chronic criticism of comrades or supervisors; decreased production; an increase in the number of visits to the Medical Department. These account for the parade of patients with such functional disturbances as headache, visual disturbance, indigestion, constipation, aching back, fatigue. Usually no organic basis can be found. Unfortunately, these conditions sometimes break over into a full-blown case of peptic ulcer, arthritis, or coronary disease. If such emotional tensions occur in persons having supervisory functions, it may have grave consequences. It may lead to high labor turnover, high incidence of grievance discussions, increase in the psychosomatic disorders. Dr. Francis J. Braceland[2] summarizes the situation:

"The tensions, pressures, and situations which help to ruin man are made up of the pressures and tensions of daily living in these insecure times, plus the hazards inherent in the particular job in question. These hazards have to do with the personality adjustments, mood disorders, ambitions, deep-seated inferiority feelings, and family, financial, and related difficulties all accentuated by the pressures of today. The worker, no matter what his position, brings to the scene of his labors all his difficulties, his home troubles, and those that affect his family. These troubles, unfortunately, cannot be left in the check-room or the parking lot. Sixty to 80% of all dismissals in industry are due to social incompetence, rather than to technical failure, this incompetence being demonstrated by hostility, aggression, frustration and anxiety, pessimism or overoptimism, fictitious independence, or morbid dependence. It is axiomatic that one badly maladjusted supervisor can cause more trouble in a plant than a case of measles."

So much for the history, and the diagnosis.

WHAT is the treatment?

The object of the treatment is to achieve emotional maturity in the individual and a high level of morale in the group. The best treatment is not the consumption of tons of headache remedies nor the use of thousands of dollars worth of "happiness pills." *The best treatment is preventive medicine.*

We begin the treatment by selection. Careful selection of new personnel is important. Careful selection of old personnel for advancement to supervisory positions is of paramount importance. Dr. C. Richard Walmer[16] in 1954 reported that: "Experience has demonstrated that healthy persons properly placed are more productive, safer, and more contented employees. Confused or ill employees have poor judgment or are prone to accidents. They have a delayed reaction time to stimuli, and they frequently miscalculate distances and speed, resulting in a decrease in their efficiency."

In addition to the pre-employment examination, the periodic health examination is an excellent means of discovering where remedial efforts should be directed. Heretofore, the periodic health examination has been applied mainly to executives. It would be wise to extend this examination to the other important assets of industry, the skilled technicians. Inasmuch as the greater emphasis on health in automatized industry will be upon the emotional and functional aspects of health, it would be wise to employ extensively the intelligence test, the aptitude test, and the

health survey questionnaire. The latter, developed at Cornell University, has proved to be of great value in discovering evidence of personality defects, such as a history of poor marital adjustments, separations, divorce, remarriages, frequent job changes, poor performance in school, truancy, juvenile delinquency, a poor military record or rejection from military duty, and a history of paranoid or schizoid tendencies.

The medical examiner should be alert to note such signs of emotional instability as excessive sweating of the hands and armpits, blushing with little provocation, nervous twitchings and tics, nail-biting, marked nervousness. Also, he should be alert to such signs of stress as undue fatigue, chronic headache, stomach trouble, and some forms of heart trouble. All of these may be signs of poor social adjustment or stunted personality development — too often rooted in an unhappy and insecure childhood and adolescence — should be carefully considered before a person is selected for employment or promotion.

Assuming that the personnel has been carefully selected, the next step in the treatment is a joint responsibility of the Personnel and Medical Departments, i.e., to get the right person on the right job. Both the training director and the industrial physician have yet to learn a great deal about the tolerance of the human organism to the stresses of its occupation. For example, note the marked attention the military is paying to the stresses encountered by jet pilots and atomic submarine sailors. The Training Director and the Medical Director should be aware of departmental situations that produce rapid turnover of employees or heavy traffic to the Medical Department. It is imperative that if sore spots be found they be eliminated or mollified. A corollary to this is that management hearken to the recommendations of the Personnel and Medical Departments. As a matter of fact, because the high degree of technical skill of workers in automation greatly enhances the value of these human assets, I believe that both the Personnel and Medical Department heads should be represented on the management team in an official capacity — in the same manner as other vital departments, manufacturing, distribution, operation, sales, are represented.

Under automation, it is necessary to keep the machinery in operative readiness for around-the-clock performance. By the same token, it is necessary to keep the employees healthy around the clock. This is not an unnecessary burden upon industry, but a means of protecting its own interests. Even the most comprehensive medical program will be less costly than losses incurred through worker absenteeism — such as those resulting in higher operating costs because of the substitution of untrained personnel, spoiled products, higher disability wages, increased hospital and insurance payments, and many intangible losses. Health counseling, health education, home safety, the principles of nutrition and proper sanitation can all be factors in a program to cut down the nonindustrial illnesses and injuries resulting in absenteeism.

The anxiety induced by the transition to automatized production can be treated by assuring the work force that the changeover is a gradual affair which has been carefully planned to avoid wholesale job displacement; and by assurance that educational programs will fit those who are qualified to accept the new opportunities and responsibilities offered them, and that plenty of encouragement and reward will be given for work well done — because the success of the enterprise underwrites the welfare of the worker.

SUMMARY: I have tried to point out that automation is the result of the evolution of industry by private and personal initiative. Certain cogent factors such as population growth, increased longevity, and inadequate educational programs, which may have a profound influence in the future, have been noted.

So far as the present is concerned, it is my belief that automation will bring many physical benefits to the employees. There will be few, if any, new medical problems, but rather a shift toward an increase in functional diseases. But, just as private enterprise can solve its problems of natural resources, it can also solve the problems of its human resources.

The solution lies in placing tremendous emphasis upon the value of the personality and dignity of the individual; in assisting him to achieve emotional maturity; and in ever striving to maintain the highest level of morale within the organization. Edwin Markham has epitomized this thought in his poem, Man-Making:

"We all are blind until we see that in the human plan

Nothing is worth the making if it does not make the man.

Why build these cities glorious if man unbuilded goes?

In vain we build the world, unless the builder also grows."

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The Forty-plus Applicant

EMPLOYERS who hesitate to hire older workers might consider the recent New York State Labor Department analysis of eight most commonly given reasons for such policy: *"Older worker is less productive."* Recent studies by National Association of Manufacturers, University of Illinois and U.S. Department of Labor show quantity and quality of work of older workers is equal to or superior to that of younger workers. . . . *"Older worker is absent more often."* U.S. Department of Labor study (1956) of 16,500 male employees working in 109 manufacturing plants showed older workers had 20% better attendance record than younger employees. University of Illinois survey of 60-plus workers showed only 9% were absent more often than those under 60, while 66% were absent less often. . . . *"Older worker has more accidents."* 1956 U.S. Labor Department study of 18,700 employees in variety of industries showed workers 45 and over had 2.5% fewer disabling injuries and 25% fewer nondisabling injuries than those under 45. (In part, perhaps, lower rate may be due to fact they're placed in less hazardous jobs.) . . . *"Older worker will not stay on payroll long enough to justify hiring expenses."* Seven-city survey of 2,000 employees showed that while workers 45 and over held about 35% of jobs during survey year they accounted for less than 25% of separations which occurred and quit their jobs less than half as often as under-45 workers. In examining work histories of 160,000 job hunters, Federal Labor Department found that for three years (1953 to 1955), almost half of those in 45 to 64 age group had held only one job, while only 35% of those under 45 held same job. . . . *"It is too costly to provide older worker with adequate pension."* This depends entirely on terms of particular plan. If benefits are geared to length of service — and they usually are — plan need not be major cost obstacle. If plan contains age limits on eligibility for participation, it will exclude new hires in older age brackets and present no cost problem. If plan provides for vesting of employee right to benefits after comparatively short period of years, little or no "savings" are realized by hiring only young employees in expectation they will have left company for greener pastures before retiring. . . . *"Older worker will cause major increases in employee group insurance costs."* Here, too, all depends on type of plan. If company provides flat amount of life insurance to every employee, cost will unquestionably rise somewhat as more and more older workers are hired. Generally, however, modest number of older applicants can be brought into group without substantial cost increase. Also, actual dollar outlay by employers for group life insurance is so modest, when compared with pension costs, for example, that it's unrealistic to believe costs should be serious obstacle to hiring older workers. . . . *"Older worker doesn't have needed job skills."* He usually has more than younger workers. Above-mentioned seven-city study showed that while 40% of 160,000 job hunters were 45 or over, this group contained 58% of all skilled persons looking for work. . . . *"Older worker is inflexible, unimaginative, will have trouble getting along with younger workers."* Studies show these factors are seriously overrated. Practical experience of many companies also shows older workers tend to possess many qualities often found lacking in younger workers: stability, will to work and work steadily, sense of responsibility, fewer "off-the-job" problems and distractions, stabilizing influence on younger workers, etc. However, there are "minus" factors which affect employability of older workers, but these can be sharply reduced or eliminated with careful planning. Thus, studies show typical plus-40 applicant is: more likely to suffer physical handicaps; less likely to meet company educational requirements; more likely to raise certain social insurance costs (such as unemployment insurance tax rates where, if laid off, he is likely to remain unemployed longer than younger worker); less likely to be able to perform work involving substantial physical exertion; more likely to create problems relating to company policies of promotion from within; likely to require, where there is a union, close union-management solution of problems involving seniority system, application of fringe benefits to older worker, etc.

From *Industrial Relations News*, June 1, 1957.

Cutaneous Reaction to Fiberglas

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GLASS is an organic compound of fusion which has cooled to a rigid condition without crystallizing. It is generally thought of as a hard, transparent, shatterable material. Fiberglas is produced by the Owens-Corning Fiberglas Corporation and is molten glass drawn into fine filaments or fibers. These glass fibers of different diameters are formed into glass wool, glass fiber mats, or yarns, from which they are fashioned into a myriad of different substances varying from fine decorative fabrics (for curtains and draperies) and insulating materials to Fiberglas reinforced plastics for many uses.

Sulzberger and Baer[1] in 1942 investigated the effects of Fiberglas insulating wool and textiles on human skin and in 1943 Schwartz[2] studied the skin hazards in the manufacture of glass fiber thread and wool. Since these early studies, glass fiber products have been used much more extensively, and are, therefore, possible cutaneous irritants in numberless more instances in the manufacture of the basic products, in the fabrication of various glass fiber materials, and in the hands of those using finished glass fiber products.

From our experience in handling Fiberglas and from our observation of persons working with the product, it was felt that any dermatitis from glass fibers was probably due to mechanical irritation rather than to specific sensitivity. It was further felt that the degree of irritation might vary with the coarseness of the fibers contacted. It was toward proving or disproving these hypotheses that this study was directed; first by patch testing human subjects, and second by rubbing experiments in animal and human subjects.

Patch Tests

THE FIRST group of subjects consisted of 50 white women varying in ages from 22 to 73 years who had never, as far as we were able to ascertain, had any contact with Fiberglas. Each was patch tested one to three times. The patches were applied to the backs of the subjects, and allowed to remain in place for 48 hours, at which time readings were taken. Observations were also made at 96 hours, one week, and one month.

The glass fibers* used in the entire experiment contained the same chemical substances. Since most Fiberglas used commercially has a starch-base sizing (#630) bound to it, we patch tested both with plain glass fibers and fibers to which sizing #630 had been bound. Fiberglas fibers of three different diameters were used. That designated #37 varied in diameter from .00070 to .00075 inches; #150 from .00035 to .00040 inches in diameter, and #333 was composed of fibers under .00003 inches in diameter.

The selection of fibers was made because they represent the coarsest, middle range, and finest sizes encountered in most of the manufactured products, such as heat insulations, textile yarns and fabrics, and sound-absorbing materials.

On one half of the back, fibers cut three to five millimeters in length were used. On the other half, fibers two centimeters in length, attached to a small piece of cardboard, the ends covered with tape so as to allow direct contact of unbroken fibers with the skin in an area of 0.75 square centimeter, were used. In this way the same fiber, in approximately the same mass, was applied to the skin. The only variation was that on one half of the back, the tests were made with cut, sharp particles, and on the other half with smooth, unbroken fibers.

The second group of subjects patch tested was composed of 92 persons employed at the Fiberglas Corporation plant in Ashton, Rhode Island, where basic materials are produced, woven into glass yarn, and wound onto large spools. The employees tested were from every operation in the plant, and were selected specifically only with relation to their length of employment. In order to test groups having short, medium, and long periods of employment, 30 subjects who had been employed less than one year, 30 subjects em-

*All materials used were furnished by Owens-Corning Fiberglas Corporation.

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ployed one to six years, and 32 subjects employed six to 15 years were patch tested. Each subject was tested with two patches of smooth, unbroken glass fibers, one with and one without sizing #630 bound to the glass.

Rubbing Experiment

BECAUSE in the patch testing we were unable to note any difference between reactions to Fiberglas with or without sizing, all of the rubbing experiments were done with fibers to which sizing #630 had been bound.

In the first five subjects, one half cubic centimeter of finely cut fibers #37, #150, and #333 was rubbed vigorously for 60 to 90 seconds into areas of skin five centimeters in diameter on one half of the back. On the opposite side of the back, unbroken fibers two inches long which had been stretched over a curved piece of celluloid and the cut ends covered with adhesive tape were used. This allowed for vigorous rubbing of unbroken fibers into the skin. In that there were no reactions with either cut or unbroken fibers on the backs of four of the first five subjects, the tests thereafter were done on the forearms. Since we had been unable, either by extensive patch testing or by the early rubbing tests to produce any reaction to the finest fiber #333, a fiber designated fiber #12 having filaments with a diameter of .0015 inches was used in the remaining rubbing experiments. Fiber #12 was the coarsest fiber used in any of the experiments. These glass fibers are used only in impingement type air filters.

Thirty of the 50 human subjects who had been patch tested one to three times, four weeks previously, were used in the forearm rubbing experiment. In these 30 subjects one half cubic centimeter of cut particles of Fiberglas #12, #37, and #150 was rubbed vigorously into areas five centimeters in diameter on the upper, middle, and lower thirds of the volar aspect of the right forearm. This was done for 60 seconds daily for five consecutive days. Unbroken fibers stretched over a piece of curved celluloid were rubbed into the corresponding areas of the left forearm. Observations were made and recorded at the end of each period of rubbing, at 48 and 96 hours, and at one week and one month after the rubbing was done.

One month after the patch testing and the rubbing experiments were finished, five of the subjects were again rubbed daily for five days with cut particles of fiber #12, the only one with which we were able consistently to obtain irritation of the skin. Biopsies were then taken on the first, tenth, seventeenth, and thirtieth days after the rubbing was done.

The epilated backs of four rabbits were subjected to rubbing experiments similar to those described on the human subjects. The rabbits had not been previously exposed to the materials by patch testing nor were patch tests done after the rubbing experiments.

Results

PATCH TESTS — The patch test reactions consisted only of small isolated, erythematous papules, some of which were capped with a tiny pustule. These we interpreted as being due to mechanical irritation from a sliver of glass penetrating the epidermis.

In Table I an attempt to grade the reactions from the 708 patch tests done on the group of 50 female subjects was made, the grading being from no reaction through one plus (1 to 3 papules), two plus (4 to 6 papules), three plus (7 to 10 papules) to four plus (over 10 papules). We noted no reactions to the unbroken glass fibers, either with or without sizing, and there was essentially no reaction to the very fine fibers numbered #333. There were fewer and less severe reactions to the #150 than to the #37 glass fibers, the coarsest used in the patch testing experiment.

Some of the subjects complained of itching at the sites where the cut particles were in contact with the skin. In general, the degree of subjective symptoms corresponded with the degree of reaction. A few persons complained of itch-

TABLE I.
FIBERGLAS PATCH TESTS — CUT VS UNBROKEN FIBERS

	CUT SHORT FIBERS												UNBROKEN LONG FIBERS											
	#37*				#150*				#333*				#37				#150				#333			
Reaction	Sized	Unsized	No.	% Total	Sized	Unsized	No.	% Total	Sized	Unsized	No.	% Total	Sized	Unsized	No.	% Total	Sized	Unsized	No.	% Total	Sized	Unsized	No.	% Total
None	8	10	18	15	32	27	59	50	59	58	117	99	59	59	118	100	59	59	118	100	59	59	118	100
+	20	20	40	34	22	25	47	40	0	1	1	1	0	0	0	—	0	0	0	—	0	0	0	—
++	24	20	44	37	5	7	12	10	0	0	0	—	0	0	0	—	0	0	0	—	0	0	0	—
+++	7	7	14	12	0	0	0	0	0	0	0	—	0	0	0	—	0	0	0	—	0	0	0	—
++++	0	2	2	2	0	0	0	0	0	0	0	—	0	0	0	—	0	0	0	—	0	0	0	—
Total	59	59	118	—	59	59	118	—	59	59	118	—	59	59	118	—	59	59	118	—	59	59	118	—

*Diameters: #37, 0.00070"-0.00075"; #150, 0.00335"-0.00040"; #333, 0.0-0.00003"; #12, 0.0015"

ing at the sites of all of the patch tests. In these subjects there was mild miliaria from the tape used. Other than these, however, no itching was noted at the sites where unbroken fibers were in contact with the skin.

In the group of the 92 employees of the Fiberglas Corporation who were tested, one had two tiny papules under each patch and three had one or two papules under one of the two patches used. Eighty-eight subjects showed no reaction at all. In no case was erythema, edema, or vesiculation noted. The few tiny papules seen were interpreted as being a foreign body reaction to spicules of glass which had penetrated the epidermis.

In addition to the patch testing, these employees were asked if they had ever had any skin trouble which they felt possibly might be associated with their occupation. Seventy of the 92 had no complaints, 10 complained of mild itching which disappeared after bathing, and two complained of itching only while working on the hammermill, a machine which hammers the glass into fine particles. Ten had objective cutaneous signs. Three of these had a few small papules on the forearms, and two, a few papules on the ankles. Three had glass slivers in their hands, and one had miliaria on the buttocks. Only one employee complained of severe itching. He had generalized itching and a generalized eruption, both of which he stated disappeared soon after bathing and changing clothing. This disturbance had been present for 10 months, the entire length of his employment. Examination revealed him to have a generalized eruption which was most severe on the trunk and consisted of many small papular and large longitudinal areas of urticaria. The longitudinal areas were at the sites of excoriations. He exhibited a marked degree of dermographism.

RUBBING TESTS — Table II is a comparison of 48-hour observations of areas on the forearms of 30 subjects which had been rubbed for 60 seconds on five successive days, using moderate pressure. Grading was done in the following manner: A one-plus reaction indicated minimal erythema; a two-plus reaction, definite erythema without eczematization; a three-plus reaction, erythema plus low grade eczematization, and a four-plus reaction indicated erythema, edema, and marked eczematization.

There were no reactions in the areas rubbed with long unbroken, glass fibers. Immediately following the first rubbing with finely cut fibers (#12), we noted a few tiny excoriations, some tiny spicules of glass in the skin, and there were many tiny petechial hemorrhages in the area. By the next day, after simple cleansing with soap and water, no spicules were noted, the excoriations were crusted, and no hemorrhages could be seen. Rubbing with cut particles of Fiberglas #12, the coarsest fiber tested gave positive reactions in all instances and severe reactions in 43% of the subjects rubbed. In the rubbing tests with a finer fiber (#37), 23% showed no reaction at all and the others showed less severe reactions than those produced by the coarse #12 fiber. Cut fiber #150, the finest fiber tested, produced no reaction in 73%, and there was only a one plus reaction in the rest of the subjects. After two weeks, all eczematization had disappeared, and after one month only various degrees of pigmentation could be seen.

The patients offered no complaints when rubbed with fibers #37 and #150, but with fiber #12 most complained of a burning, sticking sensation at the time of rubbing. The subjective symptoms were more severe at the time of the first rubbing than after eczematization began.

During the rubbing experiments one subject developed severe urticaria over her entire back about 10 minutes after the rubbing was done. She was later found to have marked dermographism.

The rubbing experiments in the four rabbits produced results comparable to those found in the humans.

Sensitization Tests

AT THREE-WEEK intervals, 50 subjects were patch tested once, 20 were patch tested twice, and 10 three times, with cut and unbroken fibers. In reapplications, patches were applied as nearly as possible to the sites of the previous patches. Thirty of the 50 were then put through the rubbing experiment and six weeks later, when all reactions had disappeared except for mild pigmentation, all 30 subjects were patch tested again with unbroken glass fibers at the exact sites where cut fibers had been rubbed into the forearms for five successive days. In no case did we

TABLE II.
RUBBING EXPERIMENT — CUT VS UNBROKEN FIBERS

	CUT SHORT FIBERS						UNBROKEN LONG FIBERS					
	#12*		#37		#150		#12		#37		#150	
Reaction	Sized	% Total	Sized	% Total	Sized	% Total	Sized	% Total	Sized	% Total	Sized	% Total
None	0	0	7	23	22	73	30	100	30	100	30	100
+	0	0	13	43	8	27	0	0	0	0	0	0
++	2	7	8	27	0	0	0	0	0	0	0	0
+++	15	50	2	7	0	0	0	0	0	0	0	0
++++	13	43	0	0	0	0	0	0	0	0	0	0
Total	30	—	30	—	30	—	30	—	30	—	30	—

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see patches of erythema, edema, and vesiculation as are commonly seen in sensitization reactions. No delayed reactions were observed.

Comment and Conclusion

AN INTENSE effort was made to sensitize some of the 50 white women used in the study, either to the glass fibers or to sizing #630 which is one very commonly used. A total of 708 patch tests was applied to the 50 subjects. After one month, 30 of these were rubbed with glass fibers in six areas daily for five days for a total of 900 applications, and this group finally was patch tested again at the three sites on the forearm, a total of 90 patch tests. In all, the glass fibers were applied either by patch testing or rubbing a total of 1,698 times over a period of four months. It was felt that the applications were intense enough and the time elapsed long enough to allow for the development of sensitization. In 92 employees examined there was no evidence of sensitivity to glass fibers or to sizing #630, although they had had intimate contact with both substances for a period of one month to 15 years. On the basis of these observations, we felt it was logical to conclude that it is most difficult to sensitize humans to the Fiberglas fibers or to sizing #630.

In no case were we able to cause any trauma with unbroken, long glass fibers, either by patch tests or by rubbing the material vigorously onto the skin. In only one instance, and that very minimal, was there any reaction at all to the very fine wool-like fiber #333. As the size of the fiber tested was increased, there was a corresponding increase in the degree and number of reactions. The immediate reaction to the rubbing of finely cut coarse fibers into the skin consisted of tiny lacerations and hemorrhages in the epidermis, and with repeated rubbing, eczematization occurred. In biopsies taken from rubbing sites we were unable with either incandescent or polaroid light to see glass spicules or foreign body reactions in the epidermis or dermis.

We concluded, therefore, that cutaneous reactions to Fiberglas (a) vary directly with the size of the fiber being handled, (b) are due largely to mechanical irritation from sharp, broken ends, and (c) are transitory in nature.

One of the subjects in the rubbing experiment and one of the employees examined developed urticaria on contact with shredded fibers of Fiberglas. Both exhibited marked dermographism. This observation, we believe, further corroborates our conclusion that cutaneous reactions to glass fibers are largely mechanical in nature. Since it is practically impossible for workers in the Fiberglas factory to completely avoid some contact with fine filaments of glass, we believe a simple test for dermographism might be a worthwhile pre-employment test for Fiberglas workers.

Practically, it seems we can further deduce that cutaneous reactions to finished Fiberglas products containing unbroken, long fibers as used in fabrics, bandage, tape, and electrical insulating materials are very remote, and that reactions to products such as air filters and insulating materials are due to mechanical irritation, transitory in nature, and are largely preventable by adequate skin hygiene.

Summary

FIFTY white women who had never knowingly been previously in contact with Fiberglas were exposed repeatedly by means of patch testing and rubbing experiments with finely cut and long, unbroken glass fibers. Ninety-two employees who had been in constant contact with Fiberglas for from one month to 15 years were also patch tested with unbroken glass fibers. We were unable to induce sensitivity in the first group and no sensitization reactions were noted in the second group. Reactions were observed when finely cut fibers were applied to the skin. These varied directly with the size of fiber used and were interpreted as being due to mechanical irritation. Two persons were observed to have severe urticarial reactions when exposed to broken fibers of glass. Both exhibited severe dermographism.

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1. SULZBERGER, M. B., and BAER, R. L.: The Effects of Fiberglas on Animal and Human Skin. *Industrial Medicine*, 11:10, 482-484 (October) 1942.
2. SCHWARTZ, L., and BOTVINICK, ISADORE: Skin Hazards. *Industrial Medicine*, 12:3, 142-145 (March) 1943.

Dieting Employees

LOW-FAT, low-cholesterol diets — recommended for people with heart or circulatory trouble — are offered to employees at Los Angeles plant of North American Aviation, Inc., and are expected to be extended to other company plants as well. North American's L.A. cafeteria also offers "TV-dinner"-type hot meals for employees who cannot readily get to cafeteria. Prepared in advance and frozen, the meals are heated in specially-built mobile units just before their transport to outlying locations at the L.A. plant.

—*Industrial Relations News*, August 24, 1957.

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Myocardial Infarction in Industrial Workers

A Study in Their Progress, Performance, and Prognosis After Return to Work

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FOR MANY YEARS, it has been the policy of Chrysler Corporation to provide reinstatement and selective job placement for employees surviving an attack of myocardial infarction. Nevertheless, a pessimistic attitude toward such patients is still prevalent among many employers and the public in general. Accumulating evidence in the medical literature[1,2,3,4,20,21] that rehabilitation and return to productive employment are possible in the majority of cases is beginning to remove this fear. Recently, Eckstein[5] reported on the "Growth of Coronary Arterial Anastomoses Subsequent to Coronary Arterial Narrowing in Dogs," in which experiments, he demonstrated that dogs exercised regularly developed better collateral circulation in their hearts than animals left at "kennel rest" with no scheduled exercise. This observation has been substantiated clinically in human patients and is seen as one of the "beneficial effects of stress." Morris and Raffle[1] in their interesting study of London bus drivers and conductors, observed that conductors, whose job required much more physical activity, especially climbing to the upper decks, than drivers, have fewer and milder attacks of myocardial infarction and after return to work, survive longer than the drivers.

It has been our good fortune to be able to study a large group of such patients who were examined in the Central Clinical Services Section of our Medical Department at the time of their application for reinstatement in employment. The following is a summary of our findings in this study and some conclusions that we have drawn regarding the abilities and performance of these patients and the value of certain clinical findings in their prognosis.

Source of Material

IN ORDER that a sufficiently long follow-up period could be included in our study, the patients applying for reinstatement in the years 1951-1952-1953 were selected. This gave us three to six years of observation of each case. During this time, 187 individuals, having illnesses previously diagnosed as myocardial infarction by their personal physicians were seen to determine their fitness to return to work. In selecting the cases for this study, the records were reviewed critically, to determine whether they met the following criteria:

1. An unequivocal history of an acute attack of myocardial infarction, with characteristic location, radiation, duration, and severity of pain and typical associated findings.
2. Persisting positive electrocardiographic evidence of the infarction at the time of examination, which was, in most cases, three to six months after the attack.
3. A complete clinical study of each case with an adequate follow-up period.

Of the original 187 cases, 107 were selected as meeting these requirements (Table I).

Analysis of Cases

ALL OF THE patients were male, hourly or supervisory, employees of a large automobile manufacturing industry.

TABLE I.
SOURCE AND SELECTION OF CASES INCLUDED IN STUDY

Patients applying for reinstatement after illness clinically diagnosed as Myocardial Infarction — seen in the Central Clinical Services Section, Medical Department, Chrysler Corporation, 1951-1952-1953.

Accepted for Study*		107
Excluded from Study for Reasons Listed:		
Atypical History	24	
Insufficient ECG Evidence	35	
Inadequate "Follow-Up"	21	
Total Excluded		80
Total		187

*Criteria for inclusion in the series: (1) History — definite acute attack with characteristic pain, severity, location, radiation and duration; no previous attacks. (2) Unequivocal electrocardiographic evidence of myocardial infarction at time of examination, usually three to six months after the attack. (3) Complete clinical study and "follow-up."

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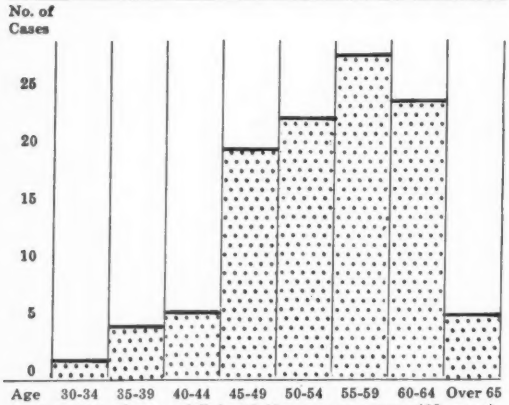
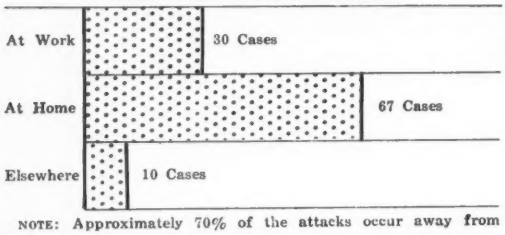
TABLE II.
AGE GROUPS FIRST ATTACK MYOCARDIAL INFARCTION



NOTE: 90% of cases fall in 45-65-year age group (92 cases), approximately evenly divided into four, five-year groups.

TABLE III.
WHERE THE ATTACK OCCURRED



NOTE: Approximately 70% of the attacks occur away from work.

Age: The youngest individual having an attack of myocardial infarction was 33 years of age, however, as would be expected, 90% of the cases occurred in the 45-65-year age group (Table II).

Where the attack occurred: Only 30 cases in this series suffered their attack while working; the great majority occurring at their homes (Table III). This finding concurs with the established fact that attacks occur with about equal frequency, day and night. Masters[6] reported that 52% of his patients had their attacks while sleeping, 22% while very mildly active, 24% while moderately active, and only 2% while under severe physical strain. Bean[7] also states that 48 of 88 patients in his series were at rest at the time of their attacks.

Symptoms preceding the infarction: Sixty-six cases (over 60%) had no symptoms preceding the attack of myocardial infarction, and a review of their employment record for several years revealed no unusual absenteeism or frequent disabilities. Forty-one patients, however, had complaints of angina or dyspnea for varying periods of time before the infarction occurred. Of these, half had their symptoms for less than one month (Tables IV and V).

Reinstatement: Of the 107 employees in this series, 100 were reinstated, 85 returning to their former jobs; 15 were reclassified and given lighter work, and seven were considered unfit for employment (Table VI). Of the latter, four have since died. Master and Dack[3] reported that over half of their series of 415 patients returned to their jobs and observed that their work did not aggravate their symptoms or predispose to further attacks. Franco,[8] whose study was more recent, found that of 82 patients surviving a myocardial infarction 90% were able to return to work, although one-third of these required some restriction of activity.

Present Status: After a followup period of three to six years, of the 100 persons who were returned to employment, 73 are known to be living at the time of this writing, and 27 are dead.

Of the 73 living patients, 56 are now employed; 13 reached the retirement age of 65, and are no longer working; and four have become totally disabled, one because of neoplasm. Note that of the 27 who died, the survival time ranged from three months to six years with an average of 2.47 years. Eight of this group reached the retirement age of 65 years before their deaths (Table VII).

TABLE IV.
SYMPTOMS PRECEDING MYOCARDIAL INFARCTION

No Symptoms		66 Patients
Angina	29 Patients	
Dyspnoea	8 Patients	
Both Angina & Dyspnoea	4 Patients	
Total Patients with Preceding Symptoms		41 Patients

TABLE V.
DURATION OF SYMPTOMS PRECEDING ATTACK—41 PATIENTS

Less Than One Week	9 Cases
Less Than One Month	8 Cases
One to Six Months	8 Cases
Six to Twelve Months	6 Cases
Over One Year	10 Cases

NOTE: 41 patients had symptoms suggesting cardiac disease before myocardial infarction occurred. 17 patients had symptoms of less than one month's duration.

TABLE VI.
OCCUPATION AFTER REINSTATEMENT

Same As Before Attack	85
Lighter Work	15
Not Reinstated — Totally Disabled	7
Total	107

TABLE VII.
PRESENT STATUS OF 100 EMPOYEES REINSTATED AFTER INFARCTION THREE TO SIX YEARS AFTER ATTACK

Working	56
Retired at 65	13
Totally Disabled	4*
Deceased	27

*Three disabled because of heart condition; one because of neoplasm.

NOTE: Of the 27 deceased, eight, or 29%, had reached retirement age of 65 before their deaths.

Zinn[9] has stated that the life expectancy for a survivor of an attack of myocardial infarction is 67.8 years and that such an attack shortens the patient's life statistically 3.84 years. In 1941, Bland and White[10] found that of 200 patients, 38 died within the first month, but 31% survived 10 years or more. They predicted that as milder cases became more frequently recognized, more favorable prognostic reports would appear in later years. However, Acker, Fritch, Burchell, and Edwards[12] reported only 7% 10-year survivals in 1956. The survival rate in our series of over 70% (three to six years) we believe compares favorably with the rate outside of industrial employment.

Cause of deaths: Twenty-two of the 27 patients who died had deaths of cardiac cause. The remaining causes of death were as follows: Cerebrovascular accidents, two; carcinoma, two; uremia, one. This information was obtained from death certificates and insurance statements (Table VIII).

Sequelae of attacks: In addition to the deaths enumerated above, persisting angina and exertional dyspnoea were noted in 33 patients, but usually symptoms were not severe enough to cause further disability. Seven patients developed evidence of congestive heart failure during the period of observation but were able to return to work again after adequate rest and treatment. Three individuals suffered cerebrovascular accidents during the period of observation, two of which were fatal, but one employee was again reinstated in his job after this complication (Table IX).

TABLE VIII.
CAUSES OF DEATH* (27 CASES)

CARDIAC:	
Recurrent Attack	16
Congestive Heart Failure	5
Ventricular Fibrillation	1
NON-CARDIAC:	
Cerebro-Vascular Accidents	2
Uremia	1
Carcinoma	2

*Obtained from Death Certificate

TABLE IX.
SEQUELAE OF ATTACKS

Angina	21 Cases
Exertional Dyspnoea	12 Cases
Congestive Heart Failure	7 Cases
Hemiplegia	3 Cases
Recurrent Attacks	16 Cases

TABLE X.
MEDICAL ABSENCES* AFTER ATTACK
(74 RECORDS REVIEWED)

No Absences (3 - 6 Year Period)	32
Few Absences (1 or less per year)	20
Frequent or Prolonged Absences	16
Total Permanent Disability	6

*Absence of more than five working days.

Performance on the Job

SINCE THESE patients were largely in an older age group, as compared to the general plant population, it may be assumed that, first, they were generally employees having the greatest seniority and, therefore, in most cases, qualified for the lighter and more desirable jobs, and secondly, that their past records of performance were above average for the industry. With these facts in mind, we studied their attendance records to determine how these compared with records of the total group of employees. Table X shows that of the 74 cases so studied, 32 had no medical absence of over five days in the three- to six-year period of observation, and 20 others had less than one such absence per year. This compares most favorably with the performance of the plant population as a whole.

Possible Prognostic Factors

IN AN attempt to evaluate our clinical findings in the light of possible signs or symptoms that might be of prognostic value in the rehabilitation and proper placement of such individuals in the future, particular attention was paid to the following factors:

1. Age of patient at the time of the attack.
2. Patient's weight at time of examination.
3. Heart size (determined by method of Ungerleider and Clark).
4. Blood pressure readings.
5. Evidence of calcification of the aorta (x-ray studies were available in 80 cases).
6. Blood urea nitrogen (Meyers aeration — titremetric method).
7. Blood cholesterol (method of Schoenheimer and Sperry).
8. History or evidence of congestive heart failure during convalescence of the patient or later after his return to work.
9. Persisting angina and dyspnoea.
10. Electrocardiographic data.

Table XI presents the comparative statistics of the two groups, namely, 73 survivors and 22 nonsurvivors. We excluded from the latter group the five patients who died from noncardiac causes. Analyses of the data reveal:

1. There is a moderate shift in the balance in favor of youth for survival. Thirty-six percent of the survivors were under age 50, while 73% of the deaths occurred in individuals over 50 at the time of their first attack. Numerous reports in medical literature bear out this observation, namely, that the earlier age at which the attack occurs, the better the prospect for long survival.[9,10,12,13]

2. Patient's weight: This seems to have little prognostic value, there actually being a greater percentage of overweight among the survivors in our series. This, of course, must also be modi-

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TABLE XI.
EVALUATION OF CLINICAL FINDINGS OF POSSIBLE PROGNOSTIC VALUE

Finding	100 Cases Total Group	73 Survivors		22 Non-Survivors (excluding five non-cardiac deaths)	
1. Age at First Attack:					
30 - 40 years	6	5	7%	1	4%
41 - 50 years	26	21	29%	5	23%
51 - 60 years	49	36	49%	11	50%
Over 60 years	19	11	15%	5	23%
2. Weight:					
Underweight	12	7	10%	5	23%
Normal	47	33	45%	10	45%
Overweight	41	33	45%	7	32%
3. Heart Size: (Method of Ungerleider & Clark)					
Normal	68	59	81%	5	42%
10-20% Increased	21	11	14%	9	21%
Over 20% Increased	11	3	5%	8	37%
4. Hypertension:					
Systolic over 150	28	16	22%	9	21%
Diastolic over 90	22	12	16%	8	36%
5. X-Ray Evidence of Calcification of Aorta:	(80 cases)	(58 cases)			
Slight or None	62	45	80%	17	80%
Moderate to Dense	18	13	20%	5	20%
6. Blood Urea Nitrogen:	(91 cases)	(64 cases)			
Normal	54	40	62%	11	50%
Elevated 16-20	25	16	25%	8	36%
Over 20	12	8	13%	3	14%
7. Serum Cholesterol:					
Below 250	60	41	56%	15	68%
250-300	20	17	23%	2	9%
Over 300	20	15	21%	5	23%
8. History or Evidence of Congestive Heart Failure:					
During Convalescence	14	6	8%	7	32%
After Return to Work	7	3	4%	4	16%
9. Persisting Angina or Dyspnoea After Return to Work:					
Angina	21	16	22%	5	23%
Dyspnoea	12	8	11%	4	18%

fied by the fact that the more seriously ill patients might have lost considerable weight before this examination by dieting or by generally poor recuperation.

3. Heart size: According to measurement made on x-ray films, as described by Ungerleider and Clark, only 19% of the survivors had significant increase in cardiac dimensions, as compared to 58% of the deceased. Master, Dack, and Jaffe[17] also found that increase in heart size was a poor prognostic factor.

4. Elevated blood pressure, either systolic, diastolic — or both, did not of itself indicate a poorer prognosis. Since all of our blood pressure determinations were made three to six months after the attack, during which interval the patient was at rest and under treatment, it may be assumed that, first, a greater number than indicated by our figures actually had hypertension preceding their attack, and secondly, that those with persisting hypertension were the more severe and unresponsive cases. Master,[6] Crain and Missal,[14] Mintz and Katz,[15] and Sigler[16] also indicate that hypertension is more common in patients suffering myocardial infarctions than in the population as a whole, but hold that hypertension alone is not a significant factor in prognosis.

5. X-ray evidence of calcification of the aorta was found to be of no value in prognosis, the percentage of occurrence being identical in both groups.

6. Blood urea nitrogen determinations were also of little prognostic significance, although there was a slightly higher percentage of elevation in the fatal cases.

7. Similarly blood cholesterol levels were of little help in determining prognosis.

8. History or evidence of congestive heart failure during convalescence from myocardial infarction definitely altered the ultimate prognosis. Only 8% of the survivors had this complication as compared with 32% of those who died. Likewise, transient evidence of congestive heart failure developing later after return to work occurred in 4% of the survivors and in 16% of the nonsurvivors. Chambers,[18] Levine and Rosenbaum,[19] Katz and Mills[12] made similar observations in this regard.

9. Persisting angina or dyspnea of nondisabling degree occurred about equally in both groups.

10. Electrocardiographic findings, at the time of examination for reinstatements, were of little value in predicting the outcome of the individual cases. More critical and detailed analysis of the electrocardiograms will be reported at a future date.

Summary and Conclusions

A STUDY of 100 survivors of proved attacks of myocardial infarction, who were reinstated in their jobs in the automobile industry after a suitable period of convalescence has been presented.

Their survival rate, we believe, compares favorably with that of similar cases elsewhere, and their rehabilitation and performance on the job has been generally satisfactory.

In an attempt to evaluate some of our clinical findings as a guide for the future in properly placing these patients, specific factors were studied in the two groups — survivors and nonsurvivors. Here we found that the younger individual, having normal heart size and no history of congestive heart failure during his convalescence from myocardial infarction or developing later after his return to work, had the best chance of survival.

On the other hand, body weight, the presence of hypertension, evidence of calcification of the aorta, blood urea nitrogen, blood cholesterol, persisting mild angina or dyspnoea, and electrocardiographic data generally were not of value in determining prognosis.

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The Last Hour

John W. left his job at a midwest plant at 4:00 P.M. on Friday, and started for home. About four blocks from the plant he stopped off at a neighborhood bar and had two drinks with "The Boys." He stayed about 10 minutes longer than he had expected so he drove a little faster than usual on the way home to avoid being late for dinner. He was about a mile from home when he went through a crossing at about 45 mph trying to beat the light. He saw another car crossing his path, but by the time he jammed on his brakes it was too late. He plowed into the side of the car and dragged it 50 feet before stopping. Both John W. and the driver of the other car were killed. Two passengers in the other car were crippled for life. Seven people were involved in the accident during and after the last hour of John W.'s life. *Policeman:* "The guy was driving 45 miles an hour in a 35-mile zone. He was way over the white line when he hit the other car." *Doctor:* "The man was dead when we arrived. He had a fractured skull and multiple fractures over the rest of the body. His body hit the steering wheel and was crushed to death." *Insurance Agent:* "The driver had only a $5,000 group insurance policy from his company. Not much to leave a young wife and two children for the rest of their lives." *Pedestrian:* "He musta been doing 60 in a 35-mile zone." *Mechanic:* "I told him that he should have his brakes relined but he said he'd wait a while." *Bartender:* "This night he was sore at his boss or something and he had an extra shot." *Nurse:* "It was the most heart-breaking thing I ever had to do when the doctor told me to report it to the man's family." *Widow:* "John was always a good driver. He never went too fast or passed a red light. Maybe, once in a while he had a drink or two or drove a little too fast. But lots of people do that."

—From *Brake Shoe News* (American Brake Shoe Company), May, 1957.

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Lung Hernia

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HERNIATION of the lung outside the thoracic cage, while not rare, is relatively uncommon. Most lung hernias result from injury and are therefore of particular interest to industrial surgeons. In this category we do not include the so-called mediastinal hernia which is a bulging or pulling of a part of one lung across the anterior mediastinum into the contralateral hemithorax.

Lung hernias may be conveniently classified as congenital and acquired. A survey of the literature indicates that about 82% of the reported cases are acquired, while only 18% are classified as being congenital. Approximately 75% of lung hernias are thoracic, while 25% are cervical in location. Most congenital lung hernias are cervical, while the thoracic hernia is generally the result of injury. Short of massive disruption of the chest wall, as in a war injury, most thoracic lung hernias occur near the sternum or the spine and generally result from rib fractures or separation of the rib-cartilage junction. The internal intercostal muscle extends posteriorly only to the angle of the rib, while in front the external intercostal muscle stops at the costocartilagenous junction. Beyond these weak points thin connective tissue sheets, the anterior and posterior intercostal membranes extend, completing continuity. Posteriorly, the overlying muscle mass composed of the latissimus dorsi, the rhomboid, and the trapezius better reinforce the weak point than does the pectoral bundle in front. This may account for the more common occurrence of anterior lung hernias.

An effort to differentiate between "true" lung hernia and "simple prolapse" has been made in some quarters. In the so-called "true" lung hernia the pleura is said to be intact, forming a sac. In the "prolapse" the pleura is said to be ruptured so that no sac is present. This is a fine distinction which is of no clinical significance and cannot be diagnosed short of surgery.

Not uncommonly there is a latent period between a hernia-producing injury and the actual occurrence of the hernia. It is difficult to account for, but may be due to a giving way of immediate posttraumatic fibrosis under the strain of normal exertion with perhaps the addition of stress due to coughing. This feature characterized the case we are reporting.

CASE REPORT: A 42 year old bowling alley pinsetter was admitted to Veterans Administration Research Hospital, May 29, 1955, after having been struck on the left anterior chest by a flying bowling pin. He complained of anterior left chest pain which was aggravated by coughing and deep breathing. Separation of the left second and third costochondral junctions was clinically detectable. A 10 cm. x 10 cm. area of paradoxical motion overlying the separation required sandbag immobilization for 10 days before the patient was able to cough effectively without discomfort. Approximation of the costochondral separations with wire was considered, but the patient's progress on conservative management was so satisfactory that further manipulation was not deemed necessary.

The patient did not notice any further discomfort nor any protrusion until five months later, October, 1955. At that time he noted the concomitant onset of pain and bulging with

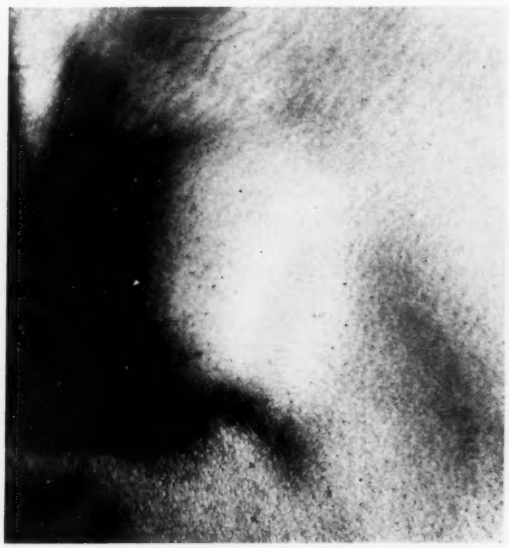

Fig. 1.

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cough. Protrusion was in the area of the 2nd interspace (Fig. 1) just to the left of the sternum, exactly where paradoxical motion had previously occurred. He found relief was afforded by manual pressure over the area when coughing. With time, the protrusion increased in size and the discomfort became greater so that he sought relief in February, 1956 — 10 months after his injury.

On readmission to the Veterans Administration Research Hospital lateral roentgenogram with the patient performing Valsalva's maneuver confirmed the protrusion of radiolucent pulmonary tissue beyond the ribs (Fig. 2). The remainder of the patient's examination, history, and routine laboratory tests was noncontributory.

On March 16, 1956, a vertical parasternal skin incision on the left was made and the fibers of the pectoralis major muscle were separated, permitting access to the fascia overlying the 2nd rib. Severance of this fascia revealed the cartilagenous defect between the 2nd rib and the sternum. There was, in addition, a pleural and fascial deficit extending from beneath the 1st rib, above, to just above the 3rd rib, below. The defect was the size of a 50-cent piece. The cartilage of the 2nd rib was found deflected posteriorly 70° into the pleural space. This segment was excised and discarded. The adhesions between the parietal pleura and the lung were released and the defect partially closed with interrupted 0 silk sutures. An autograft of fascia lata was inserted over the remaining defect and anchored with interrupted sutures in drumhead fashion. The pectoralis major was reapproximated and finally the subcutaneous tissue and skin.

The patient recovered uneventfully (Fig. 3).

Fig. 2.

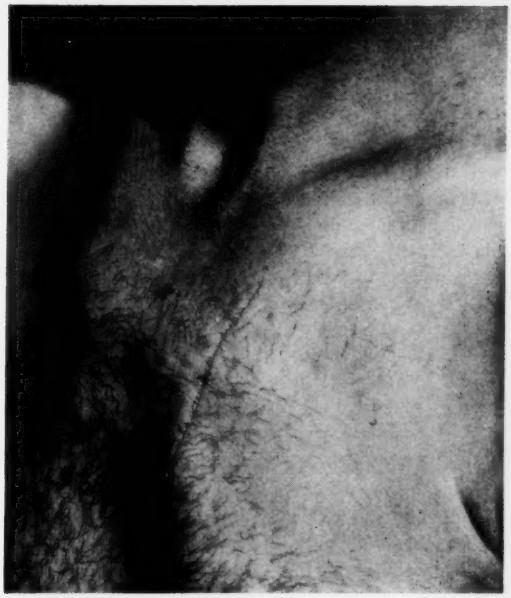

Fig. 3.

Symptoms

THE complaints referable to lung hernias are generally not marked. The patient notices an abnormal bulging which was not present before. There may be some degree of tenderness or pain in the region. The bulge is most prominent in coughing, sneezing, or straining at stool. Strangulation, in the true sense of the word, is probably impossible.

Diagnosis

DIAGNOSIS is not difficult and depends on the presence of a soft, bulging mass, prominent on straining, coughing, sneezing, and muscular effort, and disappearing or diminishing at rest. Roentgenograms taken during the execution of the Valsalva maneuver (forcible expiratory effort against a closed glottis) will show a radiolucent area outside the rib cage. While this will demonstrate the presence of a lung hernia, it will not differentiate between the presence or absence of a "sac." A history of trauma will generally be elicited.

Treatment

A LUNG hernia may be small and symptomless. Since there is no danger of strangulation, this type may well be let alone. External support is of no use. Where the hernia is large enough to produce unpleasant symptoms and worry for the patient, and where repair is the best solution in an industrial case, surgical repair is indicated.

The essence of repair is, of course, the replacement of lung into the thoracic cage and the closure of the chest wall defect. This can be accomplished in any of several ways, but individualization will probably be needed, since the

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defects are likely to be different, so that a standardized repair cannot be offered.

Tissues in the immediate vicinity of the chest wall defect can almost always be approximated to effect closure. Intercostal muscle bundles on either side may be dissected out and brought together. Periosteum can be stripped from ribs on either side of the defect and sutured together over it. In difficult cases ribs can be sectioned at one end and advanced one interspace up or down to lie over the weak spot. Theoretically autogenous bone grafts could be used to bridge defects, the donor site being tibia or other ribs.

Paulson used tantalum plate to repair a large defect, but this is not a satisfactory method since there would be difficulty in fixing a rigid plate to the moving thorax. If a prosthesis is needed, a flexible mesh such as one of stainless steel would seem better. The use of living tissue such as fascia lata is well known and possibly preferable to the insertion of a foreign body.

Anesthesia

REPAIR of lung hernia should be undertaken only with the patient under general endotracheal anesthesia since the pleural space is inevitably entered. Intrapleural drainage using a water trap is always indicated.

Summary

LUNG hernia is not rare. It is generally acquired, although a small percentage of cases are congenital.

A large majority of such hernias are thoracic in location. Since most follow trauma, they are of especial import to industrial surgeons.

Many do not require treatment. Those that do should be repaired surgically. External support is useless.

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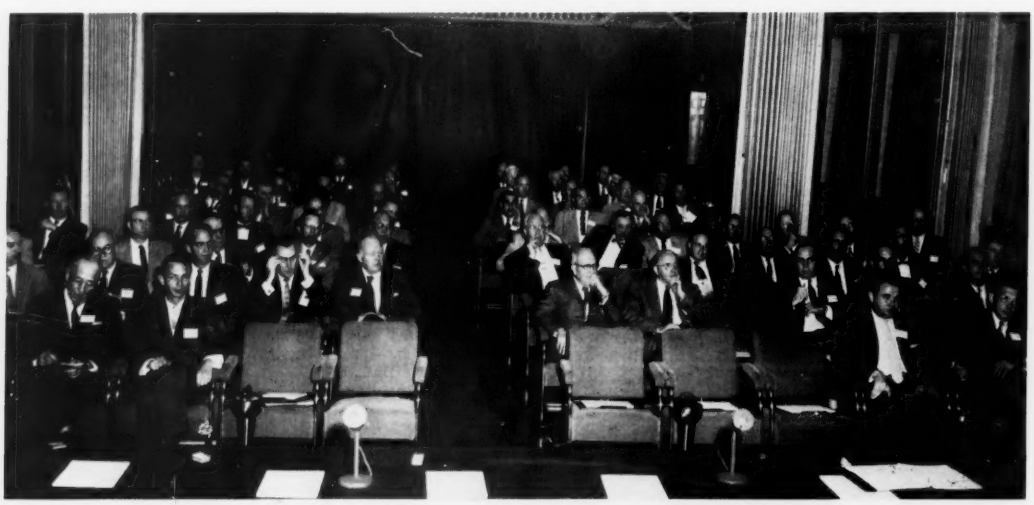
Telephone Company Medical Conference

THE NORTHERN CALIFORNIA Area of Pacific Telephone Company and the Bell Telephone Company of Nevada held a Conference for their Medical Consultants in San Francisco on September 20. Fifty-eight physicians and their wives attended. The purpose of the Conference, as stated by Dr. G. W. Nagel, Medical Director of the companies, was to "get even closer to the Medical Consultants . . . . exchange ideas . . . . outline the vital role played by the Medical Consultants in the expanding health program of the company." Highlights of the one-day meeting included talks by members of the Medical Department, Drs. G. W. Nagel, K. D. Gardner, D. A. Carson, R. S. Hockwald, C. C. Greene, Jr., (General Medical Director), and top executives of Pacific Telephone. A panel discussion was held in the afternoon. The ladies attended a fall fashion show at the Fairmont Hotel. A reception and dinner at the Sheraton-Palace Hotel put the finishing touches on a busy, fruitful day.



Smoking Habits and Mortality Among Workers in Cigarette Factories

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IN 1955 Dorn and Baum,[1] of the National Institutes of Health, reported a study on mortality among workers in cigarette factories. The specific group studied was composed of full-time employees in the several plants of the American Tobacco Company located in North Carolina, Kentucky, and Virginia. The investigation covered 70,532 person years of exposure during a 75-month period from October, 1946, through December, 1952. The primary object of the investigation was to determine whether or not workers engaged in the preparation of tobacco products, in particular cigarettes, have an increased risk of developing lung cancer. The most extensive prior statistical study was that of Kennaway and Kennaway,[2] who recorded an association between the handling of tobacco and higher-than-average lung cancer death rates in England and Wales.

In carrying out their investigation, Dorn and Baum multiplied the number of employees of each age, sex and color group by the corresponding death rate for the population of North Carolina and Virginia, thus arriving at the expected number of deaths. It was found that deaths among the cigarette workers were 32% lower than the expected number for all causes, 27% lower for all forms of cancer, 14% lower for cancer of the respiratory system, 33% lower for cardiovascular diseases, and 20% lower for coronary disease.

In summarizing their observations Dorn and Baum state that: "The results of this study show that the total mortality rate of employees engaged in processing cigarettes for the American Tobacco Company is definitely lower than that for the general population of Virginia and North Carolina. This is true for all causes, for cancer and for cardiovascular diseases. The death rates for respiratory cancer and for coronary disease among employees of the American Tobacco Company do not differ appreciably from those of the general population." Hence the findings of Dorn and Baum do not corroborate those of Kennaway and Kennaway whose statistical association presumably reflected not a cause and effect relationship between tobacco handling and respiratory cancer. Conceivably, the trend they noted could have been related to an inherent sampling error, a methodological fault which Kennaway and Kennaway themselves recognized.

Although their interest in studying mortality among cigarette workers appears to have arisen as a result of recent discussions of cigarette smoking as a possible factor in the production of lung cancer, Dorn and Baum did not determine the smoking habits of their subjects, and hence their observations do not bear on this question. In view of this the present study, which might be regarded as an extension of the one by Dorn and Baum, was undertaken in which the mortality rates and smoking habits of the workers in the same cigarette factories were compared with the corresponding figures for the general population.

Statistical Material and Methodology

Smoking Habit Figures

WE ARE INDEBTED to Finkner *et al*,[3] of the Institute of Statistics of the University of North Carolina, for making available the results of an extensive investigation, made in 1956, of the smoking habits of the permanent employees in nine tobacco processing plants of the American Tobacco Company representing the same general population studied by Dorn and Baum. It was impracticable to determine the smoking habits of the retired employees who comprised only about 5% of the population under study. Smoking habits were determined not by sampling but by applying "developed instruments" to virtually the entire group (98.1%) of subjects under study. The exact techniques employed and the detailed results are given in the

Presented at a meeting of the Section on Industrial Medicine and Surgery, Southern Medical Association, 51st Annual Session, Miami Beach, Florida, November 11-14, 1957.

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report by Finkner *et al*[3] as well as a comparison of the smoking habits of the cigarette factory employees with those of the general population as reported in 1956 by Haenszel, Shimkin and Miller,[4] of the U. S. Department of Health, Education, and Welfare, on the 1955 Census Bureau study. In connection with the smoking habit data, it should be pointed out that the 65-year-and-over age groups represent a very small number (six) of employees.

Mortality Figures

BECAUSE studies on mortality reported by Dorn and Baum and the determination of smoking habits did not coincide in point of time, and because the number of employees in these plants underwent some change between 1946-1952, the period studied by Dorn and Baum, and 1956, when the smoking habit investigation was made, a new tabulation of mortality figures was done. This covered the 48 months from January, 1953, through December, 1956. The number of deaths and the causes of death among the employees were obtained from the records of the Metropolitan Life Insurance Company, which underwrites insurance policies on all employees including those on leave and those who have retired. All other necessary data were secured from the personnel files of the American Tobacco Company.

These were the same sources of information used by Dorn and Baum. The figures on employee mortality were compared with corresponding ones for the general population derived from the deaths reported in "Vital Statistics of the United States"[5] and the population estimates issued by the Bureau of Census.[6] In view of the fact that the issues of the "Vital Statistics of the United States" covering 1956 are not available, it was felt best to use the 1954 report for the study years 1953 and 1954, and the 1955 report for the study years 1955 and 1956, inasmuch as they represent proper midpoints in the period covered by this study. This is essentially the type of procedure followed by Dorn and Baum.

In the present investigation mortality rate calculations were made on full-time and retired employees, as was done by Dorn and Baum. This gives a more conservative figure than if only the full-time employees are included. The actual procedure for the calculations was as follows:

The age-specific death rates for the general population of the United States were obtained by dividing total deaths for the year by the population estimates for that year. Rates were computed separately for male white and nonwhite, female white and nonwhite, and for each of the age groups 15-24, 25-34, 35-44, 45-54, 55-64, 65-74, 75-84, 85 and over. These rates were applied to the number of person-years of exposure in each age, color and sex category represented by the employees in the stemmeries and cigarette factories of the American Tobacco Company for the years 1953-1956 inclusive. Employees on the payroll as of July 1 of each year were taken as the bases of calculation. With these data it was possible to compute the "expected" number of deaths in the employee population and compare these with the number that actually occurred. The entire group of factory workers represented 45,455 person-years of exposure during the period studied.

Results

TABLE I gives a comparison of the smoking habits of the tobacco company employees with those of the general population. It is obvious from this table that the tobacco company employees had a higher proportion of regular cigarette smokers and, in addition, had a generally higher rate of daily cigarette consumption than the general population. The proportion of

TABLE* I.
PERCENTAGE COMPARISONS OF AMERICAN TOBACCO COMPANY EMPLOYEES AND UNITED STATES POPULATION, BY SMOKING CATEGORIES, BY SEX, RACE AND AGE

			Percent Smoke Regularly, Any Amount		Percent Smoke ½-1 Pack Daily		Percent Smoke More Than 1 Pack Daily	
Sex	Race	Age	A.T.C.	U.S. Pop.	A.T.C.	U.S. Pop.	A.T.C.	U.S. Pop.
Male	White	18-24	79.3	49.0	45.0	29.4	25.7	8.2
		25-34	78.0	59.9	43.9	36.8	30.2	15.6
		35-44	79.8	59.1	39.4	33.1	35.4	18.6
		45-54	75.0	54.1	33.9	30.0	35.5	16.6
		55-64	68.6	41.5	35.4	22.9	29.2	10.6
		65 & Over	100.0	21.6	—	10.7	100.0	3.4
		TOTAL	77.2	49.9	39.5	28.6	32.8	13.3
Male	Nonwhite	18-24	79.5	42.6	48.7	22.4	18.0	4.5
		25-34	80.6	62.1	50.0	40.2	20.7	9.1
		35-44	86.9	52.7	57.3	30.5	17.5	9.5
		45-54	82.9	51.2	54.3	28.6	16.1	6.9
		55-64	86.4	38.7	57.4	19.2	9.7	4.3
		65 & Over	—	19.9	—	7.3	—	2.6
		TOTAL	84.1	48.4	54.7	27.7	16.5	6.9
Female	White	18-24	39.6	28.8	26.2	14.9	2.7	2.0
		25-34	48.1	34.2	34.3	20.2	6.8	3.7
		35-44	48.7	32.1	32.5	18.7	9.4	3.1
		45-54	38.7	22.4	27.8	12.1	4.8	3.0
		55-64	14.3	10.6	6.8	4.9	3.0	1.2
		65 & Over	—	3.5	—	1.4	—	0.2
		TOTAL	44.4	23.6	30.8	13.1	6.9	2.4
Female	Nonwhite	18-24	66.6	25.7	33.3	10.4	—	1.4
		25-34	63.8	35.6	26.6	14.9	9.6	2.4
		35-44	63.0	24.4	38.6	9.8	3.4	2.6
		45-54	62.8	18.0	36.1	7.1	3.1	1.2
		55-64	54.3	10.0	26.4	4.4	2.9	0.4
		65 & Over	100.0	2.1	—	1.5	50.0	—
		TOTAL	61.7	22.9	34.3	9.4	4.0	1.7

*From Finkner et al.[3]

tobacco company employees consuming more than 20 cigarettes daily was double that in the general population. Among white males of the American Tobacco Company group, 77.2% were regular cigarette smokers compared with 49.9% for the general population. For white women, the comparative figures are 44.4 and 23.6%; for nonwhite men, 84.1 and 48.4%; for nonwhite women 61.7 and 22.9%.

Table II gives a more detailed comparison of the smoking habits of the tobacco workers and the United States urban population. This latter group was selected for comparison because, according to the Census Bureau report, it shows a higher rate of smoking than the other two groups, namely the "rural nonfarm" and the "rural farm." Here again the differences pointed out for Table I are of the same order between the cigarette employees and the urban population.

TABLE* II.
PERCENTAGE COMPARISONS OF AMERICAN TOBACCO COMPANY EMPLOYEES AND THE UNITED STATES URBAN POPULATION BY CURRENT DAILY RATE OF CIGARETTE SMOKING, BY SEX AND AGE

		Percent Regular Smokers		Daily Rate of Cigarette Smoking: Percent Smoke Less Than 10		Percent Smoke 10 - 20		Percent Smoke 21 - 40		Percent Smoke 41 or More	
Sex	Age	A.T.C.	U.S. Urban	A.T.C.	U.S. Urban	A.T.C.	U.S. Urban	A.T.C.	U.S. Urban	A.T.C.	U.S. Urban
Male	18 - 24	79.3	50.0	9.5	11.8	45.8	29.9	24.0	7.9	—	.3
	25 - 34	78.4	61.5	4.9	7.6	45.0	37.8	27.7	15.3	.8	.9
	35 - 44	81.7	60.3	6.8	7.7	44.1	33.5	29.4	17.1	1.4	2.1
	45 - 54	77.3	54.9	7.7	8.5	39.9	29.5	27.7	15.2	2.0	1.7
	55 - 64	75.6	42.6	10.0	8.4	44.0	23.7	20.7	9.9	.9	.8
	65 & Over	33.3	23.0	—	8.3	—	10.7	33.3	3.5	—	.5
	TOTAL	79.0	51.6	6.9	8.4	43.4	29.2	27.4	12.7	1.3	1.2
Female	18 - 24	40.1	32.5	11.2	13.1	26.3	16.9	2.6	2.4	—	—
	25 - 34	49.4	37.6	8.6	12.3	33.8	21.1	6.9	3.8	.1	.3
	35 - 44	52.2	35.1	10.3	11.4	34.0	19.9	7.7	3.4	.2	.2
	45 - 54	46.9	24.8	12.0	8.8	30.7	12.7	4.1	2.9	.1	.3
	55 - 64	34.8	11.9	15.0	5.4	16.9	5.3	2.9	1.1	—	.1
	65 & Over	66.7	3.9	33.3	2.0	33.3	1.7	—	.1	—	—
	TOTAL	48.4	26.3	10.6	9.3	31.6	14.2	6.1	2.5	.1	.1

*From Finkner et al.[3]

Table III is patterned after one presented by Dorn and Baum and shows the expected and observed number of deaths from all causes and specific causes among full-time and retired employees of the tobacco company. It is evident from this table that the over-all death rate as well as the death rates for cancer of all forms, cardiovascular diseases and coronary disease for the employees of the American Tobacco Company is definitely lower than those for the general population; for example, in the case of all causes of death, it was 31% lower. The death rates for respiratory cancer do not differ from those in the general population. These findings are in keeping with those of the earlier study by Dorn and Baum.

TABLE III.
OBSERVED AND EXPECTED NUMBER OF DEATHS FROM SPECIFIED CAUSES AMONG FULL-TIME AND RETIRED EMPLOYEES OF CIGARETTE PLANTS AND STEMMERIES OF THE AMERICAN TOBACCO COMPANY, JANUARY, 1953 — DECEMBER, 1956

Cause	Expected No. of Deaths	Observed No. Deaths	Ratio Expected to Observed
All Causes	350	241	1.45
Cancer — All Forms (140-205)	61	47	1.30
Cancer — Respiratory System (160-164)	10	10	1.00
Cancer of Trachea, Bronchus and Lung specified as Primary (162)	4	4	1.00
Cardiovascular Diseases (400-468)	137	104	1.32
Coronary Disease (420)	82	56	1.46

NOTE: Numbers in parentheses refer to cause-of-death codes per sixth revision of the international statistical classification, 1948, as used in "Vital Statistics of the United States."

Combining the information on smoking habits and mortality rates of the employees of the American Tobacco Company and comparing these data with those of the general population, result in a finding at variance with previous epidemiological studies such as those of Hammond and Horn.[7] For the one group studied, namely, white males between the ages of 50 and 69 years, these authors concluded that there was a definite association between cigarette smoking and an increased over-all death rate, and in addition, a cause-and-effect relationship between cigarette smoking and a higher death rate from lung cancer and from coronary disease. Our data, on the other hand, show that despite a substantially higher percentage of smokers and a higher daily consumption of cigarettes than in the general population, our population is at the same time characterized by a lower over-all death rate, a lower death rate for cancer generally, for cardiovascular diseases, and for coronary disease; and a respiratory cancer death rate no higher than that of the general population. This finding assumes added significance from the fact that no sampling error is involved in the methodology. The possible influence of sampling procedure on the results of epidemiological studies has been analyzed by Berkson.[8]

Summary and Conclusions

IN 1955 Dorn and Baum reported a study on the mortality of workers in the cigarette factories of the American Tobacco Company. They showed total mortality to be definitely lower than that of

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the general population of Virginia and North Carolina for all causes, for cancer and for cardiovascular diseases, and no higher for respiratory cancer and coronary disease. The present study upon the same general population of tobacco workers to which smoking habits have been added confirms their finding.

Previous statistical studies have used sampling methods which recorded a statistical association between cigarette smoking and (1) a higher death rate from all causes, (2) a higher lung cancer death rate, and (3) a higher death rate from cardiovascular diseases. By contrast this study employing mortality rates for a whole population shows a higher-than-average percentage of smokers and a much higher-than-average rate of smoking to be associated with greater longevity, relatively lower death rates from cancer and cardiovascular diseases, and respiratory cancer rates no higher than in the general population.

The existence of such a population makes it evident that cigarette smoking *per se* is not necessarily or invariably associated with a higher risk of lung cancer or cardiovascular diseases or with diminished longevity.

[ACKNOWLEDGEMENT: We would like to express our gratitude to Dr. Bertram L. Hanna, Assistant Professor, Department of Medical Genetics, Medical College of Virginia, for his help in the compilation of the statistical data bearing on expected and observed mortality rates summarized in Table III.]

Discussion

R. H. RIGDON, M.D. (Professor of Pathology, The University of Texas — Medical Branch, Galveston): The authors have correlated the smoking habits with the mortality rate of the employees in nine processing plants of the American Tobacco Company. These individuals smoke more than the group reported by Hammond and Horn and the group reported by the Public Health Service (Public Health Monograph No. 45). Seventy-seven and two-tenths percent of the white males employed by the American Tobacco Company are regular cigarette smokers, as compared with 49.9% for the general population. Although the individuals in Haag and Hanmer's study smoked much more than the average, as recorded by both Hammond and Horn and the Public Health Service, they died with essentially the same pathologic processes and at the same rate as, or lower than, the average recorded by the Vital Statistics. The mortality rates observed by Dorn and Baum in studying the causes of death in employees of cigarette factories in Virginia and North Carolina are lower than the rate for the general population of North Carolina and Virginia. The mortality data used by Hammond and Horn in their study were very different from those of the Bureau of Vital Statistics. This variation has presented problems in evaluating the conclusions as made by Hammond and Horn referable to smoking and disease.

I, of course, have questioned for many years data obtained regarding the amount smoked, as well as the death certificate for establishing the actual cause of death, and the use of these data for correlative purposes. I still hold to this opinion. However, the same type of data from death certificates was used in this study — on a group of individuals on which the present smoking habits were established — as was used by Dorn and Baum when they found that deaths among cigarette workers were 32% lower than the expected number for all causes, 27% lower for all forms of cancer, 14% lower for cancer of the respiratory system, 33% lower for cardiovascular diseases, and 20% lower for coronary diseases.

I have had an opportunity to review the data of the smoking histories on which this study was made (University of North Carolina, Institute of Statistics, 1957). It is my opinion that this survey is the best that has been published. The techniques used to establish the amount smoked emphasize the uncertainty of the data obtained by others, even including myself.

Scientists who support the statistical association between cigarette smoking and (1) a higher death rate from all causes, (2) a higher lung cancer death rate, and (3) a higher death rate from cardiovascular diseases will, in my opinion, find the study made by the University of North Carolina, the one by Dorn and Baum, and this one by Haag and Hanmer very difficult to refute.

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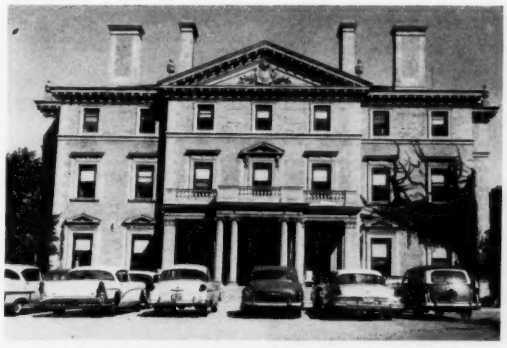
The 1957 Ramazzini Rendezvous

Scarborough, New York, October 4-6



Main club house, Sleepy Hollow Country Club.

WHEN in 1893 Colonel Eliot Shepard was building his palatial home on 338 acres of Washington Irving's "hills and woodlands" on the Hudson River, many things lay ahead of the Colonel that he did not know. He did not know that he would not live to see the completion of his mansion; that his famous architect, Stanford White, was destined some years later to be slain by Harry Thaw; that in 1910 the entire estate would be purchased by William Rockefeller and Frank A. Vanderlip; that shortly thereafter this would become the Sleepy Hollow Country Club; and that there in 1957 the Ramazzini Society would stage its annual assembly. All these things did happen.

No consideration is directed to the moot matter of the Ramazzini Society adding distinction to a venerable club or instead the venerable club adding luster to the Ramazzini Society which makes no pretenses to the venerable. Avoiding any conclusion, the Ramazzinians gathered for their now well-patterned program of industrial medical pursuits. These were guided by this year's two servants, Dr. Leonard Greenburg and Dr. Harry E. Tebrock. The one formal event of the occasion, the annual Ramazzini oration, was delivered by Dr. William O. Baker, Research Director of the Bell Telephone Laboratories in New York, on the topic "The Meaning of Science in an Industrial Society."

The Ramazzinians took note of the organization in England of a counterpart society, "The

The Ramazzinians at Sleepy Hollow.

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Entrance to Sleepy Hollow.

Ramazzini orator, Dr. William O. Baker.

The annual oration appealed to all.

Charles Turner Thackrah Society," with objectives not known to be dissimilar to those of the Ramazzinians. Likewise, the Ramazzinians reapprised themselves of the creation of a European Ramazzini Society. With the advent of just a few more organizations all dedicated to the same services it becomes possible to contemplate a congress of affiliated societies on an international basis.

By some repute, the Ramazzinians are a roisterous body of Hedonists in search of the convivial and the jovial. Admitting all in moderation, the Ramazzinians foremostly are dedicated to explorations of the best in occupational health, holding that what will be important in the totality of occupational health tomorrow needs be manifest to the Ramazzinians today. A Ramazzinian among Ramazzinians has been reduced to his essence as a man, a physician, an industrial physician. Shorn of all pomposity, all arrogance, the Ramazzinians in their professional humility best may be characterized as a colony of mental nudists.

All such pursuits will be furthered in the 12th Ramazzini Conclave in 1958 under ministrations of the newly accepted servants, Dr. L. E. Hamlin, of Chicago and Dr. J. F. McCahan, of Boston, at a rendezvous site here undisclosed.

The year's servants, Dr. Harry Tebrock and Dr. Leonard Greenburg.

Parney, Leggo and Selby solved many perplexities.

The food was superb.

Industrial Hygiene Foundation

Twenty-Second Annual Meeting, October 30-31, 1957
Mellon Institute, Pittsburgh

THE PLACING of a blindfold over the eyes of "Justice" may constitute a historical error. Instead, perhaps Justice should have been symbolized as wide-eyed, open-eared, sharp-minded. It is by no means certain that Justice always is served in industrial compensation courts and in compensation legislation. Consistently efforts and achievements tend toward enlarging benefits, extending the period of coverage, and including by interpretation many affections not contemplated by the laws themselves. The end is not in sight, and a state has been reached where in a measure there is an overthrow of the ancient dictum that "under no circumstances shall it come about that an industrial accident or occupational disease is financially profitable to the patient."

One answer to this growing menace resides in enlarged and more active programs within industrial Medical Departments. For some decades the forte of industrial medicine properly has been labelled "prevention." Now prevention has become a double urgency in all medical programs, to the end that increasingly there will come about a lessening number of compensation matters, however maladroit some adjudications may continue to be. This was one essence in the Industrial Hygiene Foundation's latest annual meeting program.

Several items on the Medical Conference program would never have appeared a decade or a score of years ago, and even now their identification with industry provides an element of astonishment until due appraisal has come about. Thus one address was on "Drugs Effective Orally in the Treatment of Diabetes," by Dr. Arthur Mirsky, Professor of the Department of Clinical Science in the University of Pittsburgh School of Medicine. The appropriateness of this presentation is reflected in the statement of one attendant who noted "a single case of diabetes in a younger worker in our company might lead to an aggregate cost of $20,000 over the years. The prevention of even one occurrence of a number of chronic diseases presents measurable savings in our operations." However, Dr. Mirsky indicated that at this time there is no effective oral therapy for diabetes for human beings, although the prospects are good for early achievement in that domain.

Participants of a panel discussion on New Socio-Medical Concepts Involving Industry were (left to right) M. M. Olander, Director of Industrial Relations, Owens-Illinois Glass Company; J. Donald Babb, President, Babb & Company; Jacob J. Blair, Professor of Industry, University of Pittsburgh; William A. Sawyer, M.D., Medical Consultant, International Association of Machinists; James H. McDonough, M.D., Medical Director, Rome Cable Corporation; and E. H. Carleton, M.D., General Medical Director, Inland Steel Company.

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Chemical-Toxicological speakers (left to right): H. W. Speicher, Westinghouse Electric Corporation; Dr. Anna M. Baetjer, The Johns Hopkins University; N. A. Talvitie, Occupational Health Field Headquarters, U.S. Public Health Service; and Dr. George Kitzes, Aero Medical Laboratory, Wright Air Development Center, United States Air Force.

In this same attitude were other presentations, such as "New Developments in Chemotherapy of Cancer," by Dr. C. P. Rhoads, Director of Sloan-Kettering Institute for Cancer Research, New York, who reported that the formidable postulates of Koch with respect to infectious diseases have been met in regard to cancer. Now the offending agent in the form of cancer cells has been established; these cancer cells have been cultured artificially; and these cultured cells, reinoculated into a patient, have reproduced the orginal type of cancer. While chemotherapy is developing under experimental conditions, not yet is it possible for human cancer victims to be served with any certainty of outcome by chemotherapeutic events.

Still further in this program that only erroneously would appear to be remote to industrial medicine was the consideration of the "Chemotherapy of Infectious Diseases," by Dr. A. I. Braude, Professor of Medicine in the University of Pittsburgh School of Medicine. Dr. Braude urged that penicillin be accepted as the towering king of the antibiotics, with little prospect that in any foreseeable time will its eminence be threatened. Dr. Braude was undisturbed that some bacterial strains become resistant to penicillin, or that allergy is of fairly common appearance in those treated. Other antibiotics prove to be of peculiar worth in various therapeutic needs, in recognized worth beyond the field of penicillin applicability.

The general medical profession at times has professed annoyance that some industrial physicians may undertake the treatment, and the management, of medical matters not clearly originating from work causes. It now becomes manifest that compensation boards sometimes extend coverage to diseases not recognized by industrial physicians as being of work origin. Under such circumstances physicians perforce will be obligated to undertake treatments which historically, and within the considered judgment of the present generation of industrial physicians, would be viewed as falling within the domain rightfully belonging to the family physician and general practitioner. A few years ago, aside from trauma involving the chest, heart diseases apart from emergencies consistently would have been referred to family physicians. But nowadays — as the result of seemingly overzealous compensation bodies providing compensation for cardiac conditions merely because they arose in workers or first attracted attention on industrial premises — industrial physicians are being required to broaden their activities, even though oftentimes against their inclinations.

THE INDUSTRIAL HYGIENE FOUNDATION'S own concept of its major function in the world of occupational health is to serve its own members through the provision of a supplemental staff of experienced investigators and counselors. At no time has the Foundation promoted itself as any substitute for a Medical Department, even in plants too small to justify regular medical services on plant premises. Some unfavorable attitudes are directed toward the Foundation through the contention that it hampers the orderly growth and expansion of occupational health through in-plant services. Such unfavorable criticism is unwarranted as long as emphasis is upon services to those "supplemental qualities" provided at the plant.

That supplementation finds one form of expression in the representation by the Foundation that it is a "communications center," or otherwise an "information center," principally for its members, but in a measure for the whole country. The annual meetings of the Foundation chiefly center about this function of being a communications or information center. Information and communication were continued through various sessions, some of which are now specified. In the panel discussion on "New Socio-Medical Concepts Involving Industry," more than one speaker indicated that many of the present-day pension plans, retirement funds, and other financial arrangements with long time projections, are not sound, and that some are in precarious plight.

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Medical Conference speakers (left to right): Dr. Dorothy M. Rathmann, Corn Products Refining Company; C. P. Rhoads, M.D., Director, Sloan-Kettering Institute for Cancer Research; and A. S. Marrazzi, M.D., Director, Research Laboratories in Neuropsychiatry, Veterans Administration Hospital, Pittsburgh.

Legal Conference speakers (left to right): Sherman S. Pinto, M.D., Medical Director, American Smelting and Refining Company; and Joseph Dean Edwards, New York City, whose topic was Heart Disease and Workmen's Compensation.

Even certain governmental facilities are involved in miscalculations, all to the end that a degree of jeopardy attends the prospective financial status of some old workers and some others soon to become old. Likewise it was observed that the totality of fringe benefits now approximates 30% of the workers' incomes (but always with variation), and that many items within the fringe basket are not subject to taxation. This is generating concern within the federal government which consistently regards provisions that lead to tax exemption as anathema. The widespread practice of compulsory retirement at age 65 or any other arbitrary age uniformly was condemned as undesirable and constituting the foundation of some of the financial deficiencies just mentioned.

IN THE Legal Conference it speedily developed that there are increasing demands for higher rates of compensation payments, broader coverage, and departure from the intent of some legislation. All this eventuates in higher costs of production. Yet the representative of one outstanding corporation indicated that through a superior program of prevention, compensation costs in his company were lower than the costs for lead pencils. Thus the need for prevention in the industrial medical program becomes paramount.

The Engineering Conferences, two in number, faced numerous technical situations with emphasis on ventilating systems and noise.

DOMINATING the general sessions that comprised the second day's program was the realization that at this immediate time the need for outstanding industrial medical programs is greater than ever before. A prime reason for this state of affairs is that new and possibly injurious substances being introduced into industry for sound technical applications are far outrunning the facilities and personnel skilled in the exploration of such substances. A second and equally cogent reason is that just ahead there may lie a long period of industrial manpower shortage for all of industry. This calls for added effort in measures for human conservation. This is nothing new for industrial medical programs, since from the beginning the objective has been directed to just that end. Even in the absence of newness in programs the extent and ramification of industrial medical pursuits need expansion in order that human conservation may be obvious, predictable, and certain.

NOTICE

APPLICATIONS are being solicited for Scientific Exhibits for the 1958 Industrial Health Conference to be held in Atlantic City, New Jersey. Exhibits will be shown from April 22 through April 24. Application blanks may be obtained from DR. J. H. WOLFSIE, Chairman of the Scientific Exhibits Committee, % American Cyanamid Company, Linden, New Jersey.

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Industrial Medical Association

President's Page

"CYCLE succeeds unto cycle," and in a little while 1957 will have taken its place in eternity's cumulation. Another year! In many respects that is all each twelvemonth is — for "who can say which is the year of the oak?" Events occur, influences emerge, but these may — indeed, usually do — have roots in a gone decade. The seasons revolve, and one day is much like another. . . .

With all their sameness, however, the segments of time assert their own distinctions. Important to history — the year's occasions; important to the oak — the year's continued strong and sturdy growth.

OUR IMA year of 1957 has both importances. "Another year," but it will have been a year of earnest work, and, no less, of significant accomplishment — especially distinctive in "strong and sturdy growth." Its evidences of progress are many. Among them the following come to mind:

Our District Counselors have grown to 35 in number and to consultant stature in organizational developments. Our Component Societies — now 13 — have taken their places as recognized protagonists of industrial medicine in the localities they serve. Our membership has continued to increase, steadily and satisfactorily. Our liaison with other professional associations and scientific societies has opened many new lines of communication between our now-acknowledged specialty and theirs — to the common good of all. Our voices are heard more effectively in the halls of education. Our insignia of OHI Certification — according to IMA standards — appear more often in the factory and the office. Our contacts with management have been more numerous, and much more prolific of mutual understanding and respect. Our public relations efforts have begun to elicit response. Our international relations have been furthered by attendance of IMA members at industrial medical meetings — as well as contributions of IMA members to industrial medical literature — in almost a dozen foreign lands.

We can be proud of these evidences, to be sure, but our pride will be tempered by the realization that while our oak is flourishing mightily it is not yet full-grown. . . .

IF ANY one development of the year were to be mentioned as outstanding, I believe it might embrace the increasing number of our Committees, the enlarging areas of their activities, and the enhancing wholeheartedness with which they are devoting time in unstinted measure and abilities of superior order to the matters assigned them. The results are a growing aggregate of reports, distinguished in substance, and timely in importance. Many of these now coming to completion represent the continuing work of years. As they reach final form and are published from time to time it is more than likely that there will be found among them a number of texts that will eventuate as "rule-and-guide" in the future of their subjects.

ANOTHER development especially noteworthy concerns the IMA Past Presidents. More and more their terms of office seem a beginning rather than an end as regards usefulness to the Association. The Presidency — capstone of four years of dedication to IMA responsibilities — seems steppingstone to more and greater service. Our Committee Chairmen now include five Past Presidents; and 10 more are Committee members. What limits can there be for an organization in which the wisdom and experience of such capable and devoted men are among its sinews of success?

AT 1957's end we look ahead to our 1958 Industrial Health Conference at Atlantic City, April 19-25; our 1959 Industrial Health Conference at Chicago, April 25-May 1; our 1960 Industrial Health Conference at Rochester, New York, April 23-29; and, after that, to the Thirteenth International Congress of the Permanent International Commission on Industrial Medicine to be held in New York City in the summer or early fall of 1960. The International Congress is coming to the United States at the invitation of the Industrial Medical Association, extended by Dr. Robert E. Eckardt at Helsinki last July. It must not be forgotten that our sponsorship thus promised involves a duty to be done as well as a privilege to be enjoyed.

MEANWHILE it is the season of good will, and thoughts — and hopes — of peace. "So hallowed and so gracious is the time," one wishes it might permanently prevail. Merry Christmas! And best of good wishes for a Happy and Fruitful New Year!

Jerome W. Shilling M.D.

John J. Prendergast, M.D.
1902-1957

JOHN J. PRENDERGAST, M.D., 18 years Medical Director for Chrysler Corporation in Detroit, died in Sarasota, Florida, September 15, 1957.

Dr. Prendergast assumed duties with Chrysler Corporation in August, 1936, after having served for a number of years as Medical Director of the Receiving Hospital, also in Detroit. Prior to his appointment, Chrysler Corporation had operated without any Medical Director, and without any central medical appointments for its numerous plants in several states. By the time he retired, May 1, 1954, on account of cardiovascular disease, the Medical Department had expanded to a staff of 142 physicians and nurses, with activities in some 28 plants. At the central headquarters in the Highland Park plant in Detroit many unusual medical features characterized the program.

In 1954 he was succeeded as Medical Director for Chrysler Corporation by Dr. Marion Jocz, long his medical associate.

DR. PRENDERGAST was born in 1902 in Grafton, West Virginia. He attended Carlton Academy, Summit, New Jersey, St. Bonaventure's College, Allegheny, New York, and was graduated from Loyola University, Chicago, with the degree of Doctor of Medicine in 1927. He began his internship at Mercy Hospital, Chicago, in 1927, and in 1928 he was a Fellow at Chicago Lying-In Hospital. He came to Detroit in 1929 as Assistant Resident Gynecologist at Herman Kiefer Hospital, and the following year was named Assistant Resident Obstetrician at Herman Kiefer. From 1931 until 1936 he served successively as Resident Gynecologist, (1932-33), Chief Surgeon (1933-34), and acting Medical Superintendent and Chief Surgeon (1934-36) of Receiving Hospital, Detroit.

He was active in many professional organizations, including the American Medical Association, the American College of Surgeons, the American Association of Surgery for Trauma, the Industrial Medical Association, the Detroit Academy of Surgery, the American Public Health Association, and the Michigan State Medical Society.

In 1935 he married the former Frances Elizabeth Whitehead, and to this marriage were born three children, two sons and a daughter.

Among his several contributions to the literature of industrial medicine were "Chemical Gas Gangrene from Metallic Magnesium," (*Indust. Med. & Surg.*, 11:2, 71 (February) 1942) and "Unexpected Occupational Disease Exposures During Wartime," (*A. J. P. H.*, 1943). His years shortly after 1954 were spent in Florida. Prior to that time and prior to his retirement, his large estate near Dryden, Michigan, north of Detroit, was a fitting assembling place for his numerous friends and associates.

DURING the years that Dr. Prendergast was Medical Director at Chrysler, in joint effort with Dr. S. F. Meek, then the Assistant Medical Director, and Dr. Carey P. McCord, the corporation's Consultant, he assembled the photographs of notables, historic and modern, in industrial medicine and industrial hygiene, the world over. The total number approximates 175, starting with Agricola and ending with many still alive. These likenesses as procured constituted a heterogeneous lot; some represented photographs from oil paintings; some were pen and ink sketches; many antedated the age of photography. All of them were altered into a standard form of size and color.

This assembly provides the best collection of historic figures in occupational health anywhere extant. Lately this collection was presented by Chrysler Corporation to the Institute of Industrial Health of the University of Michigan in Ann Arbor.

When the new building of the School of Public Health at Ann Arbor, now under construction, is completed, the Chrysler collection will be made a permanent display in the extensive quarters allocated to occupational health.

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Books

Monograph No. 1: Plant Enemy No. 1

NOISE AND YOUR EAR: ARAM GLORIG, JR., M.D. Grune & Stratton, New York, 1957, pp. 152.

Apart from the inherent merits evident in all chapters, this book will attract attention as the first in a new series, "Modern Monographs in Industrial Medicine," with Dr. A. J. Lanza as Editor-in-Chief. This series was suggested by the I.M.A. Committee on Publications and Editorials, which, without sponsorship, harbors high hopes for the success of these contributions to the totality of occupational health literature. Others in the series are in varying states of editing and compilation. This first product presages acclaim for all.

This book on noise is not all limited to industrial noises, and is by declaration not a highly technical one. Written at the level of the industrial physician, any reader may rejoice over the absence of a myriad of ultratechnical terms and descriptions that mark and mar all too many recent publications on noise.

The contents center about these major headings:

Noise Exposure.

Development of Compensation Laws.

Audiological and Medicolegal Terms.

Anatomy of the Ear and Theories of Hearing.

The Measurement of Man's Responses to Sound.

Pure Tone Audiometry.

Speech Audiometry.

Test Procedures, Personnel, and Records.

Test Environment and Test Equipment.

Hearing Loss, General and Occupational.

Effects of Hearing Loss on Social and Job Activities.

Conservation of Hearing in Noise.

Compensation and Rating Scales.

Modern industrial medicine in this country always has been saddled with some varying double trouble-maker — for example silicosis in the depression years. Currently Plant Enemy Number 1, and in a measure Public Enemy Number 1, is noise. This book is destined to contribute to the capture and execution of that enemy.

Statistical

EMPLOYEE HEALTH SERVICES, A Study of Managerial Attitudes and Evaluations: Institute for Social Research, University of Michigan, Ann Arbor, 1957, pp. 144.

This author agency made available to itself 262 work places for the purpose of interviews, chiefly with management, as to attitudes and evaluation of employee health services. For this enterprise five large cities were chosen as representative of the entire country. Foremostly the plants were of a size reflected by 250-500 employees. No large industrial establishments are mentioned, although with reservation some 500 employee size plants are regarded as "large." Promptly it developed that 166 of the sample maintained no medical personnel on their premises. Further, the sample included 49 general hospitals, although few hospitals provide any organized employee medical services comparable to good industrial enterprises, even though many might well do so. Only three plants within the total sample employed full-time physicians.

These explorations led to the book title here repeated, "Employee Health Services — A Study of Managerial Attitudes and Evaluations." Then later, at the beginning of the table of contents, this language appears, "Employee Health Services in General." By language and by implication this report purports to be an over-all estimate of industrial managerial attitudes and evaluations. A vastly better service would have appeared if the title and the text might have stressed "small" as characterizing the plants investigated, noting that the majority of the original sample operated no in-plant health services. It is submitted that good industrial medicine has been tried in absentia by a jury of non-peers. Beyond the small plant with its manifestly trying perplexities as to employee health services, this report is rejected as not pertinent to large industry medical activities.

Within the small plant range the content of this book at times is enormously provocative and illuminating. Items unstressed by the compilers provide appeal, and long have been wanted. A few are mentioned; more deserve the same treatment:

The level of preventive activity is much greater if the establishment has both a doctor and a nurse, than if only one or the other is present.

It may be noted that most managers judge the effectiveness of health services on bases other than direct cost savings. Employee satisfaction with the service is at least as important as costs. Personal qualities of the medical staff and evaluations of others are elements which cannot be disregarded. Taken together, these findings indicate that many managers do not perceive it to be appropriate or necessary to apply the traditional economic theory of costs and returns to decisions about health matters.

Credulity is taxed by the statement that only 8.4%

ANNUAL SALARIES OF DOCTORS AND NURSES PER EMPLOYEE

Dollars of Salaries per Employee	Percent of Establishments with Health Services
Under $2.00	6.2
$2.00 to 3.99	10.4
4.00 to 5.99	19.8
6.00 to 7.99	7.3
8.00 to 9.99	11.5
10.00 to 14.99	9.4
15.00 to 19.99	2.1
20.00 to 24.99	3.1
25.00 or more	3.1
Not ascertained	27.1

ANNUAL SALARIES OF DOCTORS AND NURSES PER HUNDRED DOLLARS OF PAYROLL

Dollars of Salaries per Hundred Dollars of Payroll	Percent of Establishments with Health Services
Under $ .05	1.1
$ .05 to .09	8.3
.10 to .14	14.6
.15 to .19	8.3
.20 to .24	11.5
.25 to .29	5.2
.30 to .34	3.1
.35 to .39	8.3
.40 to .44	5.2
.45 and over	6.3
Not ascertained	28.1

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COMPARISON OF WORKMEN'S COMPENSATION PREMIUMS IN ESTABLISHMENTS WITH AND WITHOUT REGULAR MEDICAL PERSONNEL WITH THE SALARIES OF MEDICAL PERSONNEL
(in dollars per hundred dollars of payroll)

Establishments with 250 or more employees, in industries:	Workmen's Compensation Premiums in establishments		
	Without Medical Personnel	With Medical Personnel	Difference
General merchandise stores	$ .54	$ .37	$ .17
Machinery manufacturing (except electrical)	.93	.56	.37
Nonprofit general hospitals	.76	.57	.19

WILLINGNESS TO JOIN IN A SHARED HEALTH ARRANGEMENT
(Establishments which have no regular doctor)

	Selected-Industry Sample		Cross-Section Sample	
Very willing	2.9%	11.5%	5.2%	14.6%
Willing	8.6		9.4	
Pro-con	2.9		1.0	
Unwilling	11.4		10.4	
Very unwilling	58.5		67.7	
Not ascertained	15.7		6.3	

WHO BENEFITS FROM HEALTH PROGRAMS?

	Percent
The company benefits	53.9%
The employees benefit	43.6
Both the company and the employees benefit	8.4
Other benefit (community, patients)	3.0
Not classified	5.8

of managers accept health services as beneficial both to management and to employees. And much more valuable than all the careful analysis of this too-small sample might have been the expansion of the "Very Unwilling" in the Table on "Willingness to Join in a Shared Health Arrangement." The 58.5% and 67.7% who were reluctant, must have had reasons. What were they?

The prospective diner handed an elaborate menu does not have to approve all, in finding a suitable dinner. Some might eschew the chitterlings or the lamb fries. So with this book. Its entire contents need not be espoused to whet or satisfy the intellectual appetite. It contains some scientific chitterlings and lamb fries.

Eliminate the Partitions

PERSONNEL ADMINISTRATION, A POINT OF VIEW AND A METHOD, ed. 3: PAUL PIGORS and CHARLES A. MYERS. McGraw-Hill Book Company, Inc., New York, 1956, pp. 711, $6.00.

As so many of Industry's Medical Directors — 51% is one survey figure recalled — report to the industrial relations manager, it was thought desirable to learn the "point of view" presented in a new revision of a nine year old work on personnel administration. This book, prepared by two industrial relations faculty members from the Massachusetts Institute of Technology, utilizes the case method to illustrate the body of theory well presented and documented in the first half of the publication. All of the elements of personnel administration are offered, such as the functions of the administrator, the relationship with trade unions, interviewing, teamwork, executive development, morale, turnover, grievances, wages, and employee services and programs.

It is to a segment of this last area that inquiring attention is directed: employee health and safety. First of all, in weighing this as an important activity in the spectrum of personnel goings-on, it is found light in the balances. Only 16 pages are devoted to the chapter, and of these but a scant four are utilized to familiarize the personnel-oriented reader with medical programs. (This is increased minutely if one adds two case studies relating to health and safety.) This, in essence, is a rather abrupt dismissal of material which should be in greater volume in the general work lore of the personnel director.

Not unknown in industry is the absence of a smooth working relationship between personnel and medical administrators. The minimizing of occupational medical practices will not aid in cementing what should be a tight bond.

Covered in general terms only are "policies for safety and health, planning for health and organization for health." The "working principles" cited as basic in health services are from the American College of Surgeons' recommendations of 1938, excellent at the time, but surely modernized by more current publications of the Council on Industrial Health of the American Medical Association. The more insightful writing on the organization for safety bespeaks, one would believe, a greater acquaintance of the authors with accident prevention than with health promotion. This is to be regretted, for it is urgent that students in industrial relations be given greater understanding of the objectives of a full medical program.

A thumbing of this work gives rise to a thought. Would it not be of considerable worth were much of the material on such topics as employee morale, labor turnover, interviewing, and teamwork, to be included in our texts on occupational medicine? If these items represent the area in which our country's skills in industrial health have strengthened, then should they not have as important a place in the reference texts as toxicology? Those who are in closest contact with workers feel deeply the need for as great an effort in the prevention of social pathologic change on the job as of somatic illness.

Once more, even in this otherwise excellent work on personnel administration, we have learned that too long, as Dr. Rutherford T. Johnstone coined it several years ago, have we been talking to ourselves. In so doing, our voices have not even penetrated the partition into the office of our neighbor next door—the personnel director. It is not thinner partitions that are indicated—just removal of those now standing. —JEAN SPENCER FELTON, M.D.

Almanac

THE AMERICAN WORKERS' FACT BOOK: United States Department of Labor, U.S. Government Printing Office, Washington 25, D.C., 1956, pp. 443, $1.50.

This book is a sort of "World Almanac" limited to American workers. It is about of the same size and has a similar format. Have you need to know the total number of farmers in the United States?

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This fact book readily will furnish the answer. So, also, any need will be met as to migration within the labor force, the total labor pool, the annual average unemployment, regional differences in wage levels and on through hundreds of similar informations. Entitled "The American Workers' Fact Book," it is not addressed to the worker himself, although he would profit by its use. More copies are likely to be found among editors, labor representatives, employers and employment directors. For students in educational institutions concerned with workers and employment, this fact book practically is the required thesis itself. Well the title of this publication might have been "The American Fact Book about Workers."

"I Couldn't Put It Down!"

SURGEONS ALL: HARVEY GRAHAM, M.D., Philosophical Library, Inc., 15 East 40th Street, New York 16, pp. 459, $10.00.

In the English language the word "surgeon" is one of few containing as it does both the letters "u" and "g," that does not provoke a little flesh crawling whenever encountered. Few persons may face the words "ugly" or "slug" without a little emotional annoyance. Not so for "surgeon," or that other nice "u g" word, "sugar."

Regardless of all that, this book purports to be tales about a thousand and one surgeons. Not so. Those many surgeons are merely hung about inconspicuously on the well painted scenery of that which is of greater importance — surgery. Even the author is carried away by his book, not by his own cleverness in writing (although there is much cleverness), but by the captivation of the historical field which he happily invaded. That invasion took place long ago, as far past as to antedate Hitler's entry into Poland. First published then, war turned all eyes in other directions.

Those surgeons on the scenery, find themselves hanging alongside body snatchers who rub elbows with princes and peasants. Quacks and mountebanks, freaks and witches, Amazons and bearded ladies, all jostle these famous surgeons. This scenery swiftly moves from native villages in Africa with their ritual surgical tortures to the Imperial Palaces of Rome, from battlefields to monasteries, from the hovel of a woman credited with giving birth to rabbits to the Temple of Health with its Celestial Bed, from the gallows to the graveyard, and from the incantations of Aesculapius to the modern operating theatres.

The preface writer, Oliver St. John Gogarty, bubbles in his approbation of the book. He starts off by noting:

"This is the best book on surgery I have ever read. I agree with every word of it except the reasons given for the removal of the Amazon's right breast. This was done, not to determine 'all the strength and fullness to the right arm,' but to save the breast from the bowstring, as anyone who has shot a bow will realize. It was done in an age before brassieres were invented. It is one of the few operations of ancient surgery that was directly utilitarian and inspired by common sense. Let me remark that it is not the author who recounts the purport of the operation, but one of the Hippocratic writers."

In the midst of the quotable in this book, meaning the entire book, one finds a passage that reflects the exactness of the author's reach into all that is pertinent in the gropings of early surgery. Observe:

"In A.D. 431 a religious quibble which became a schismatic squabble did more to assist surgery than any priestly support that the art has received either before or since that time. Ironically enough, the quarrel which saved surgery from complete eclipse had nothing to do with surgery. Nestorius, who had become Patriarch of Constantinople three years previously, taught a heretical doctrine. He believed that the Virgin Mary should be styled 'Mother of the Christ' and not 'Mother of God.' A General Council of the Church excommunicated him, and Nestorius and his heretic followers fled to Mesopotamia. At Edessa they established a seat of Greek learning, and built up a medical school, which centered round the two hospitals there.

"Some 60 years later the orthodox Bishop of Cyprus expelled all Nestorians from Edessa. They fled to Persia and established at Jundeshapur a famous school which was the true starting point of Mohammedan medicine and surgery. There they kept alive a knowledge of Greek surgery for a long 200 years till, in the seventh century, the banners of triumphant Islam were flying over the whole of the Near East. Then a sudden passion for culture possessed all Islam. A frenzy of translation began. Greek works which were in possession of the Nestorians were all translated into Arabic. Later on the Arabic was translated into Latin, and it was these Latin versions of the Arabic translations of the works of Galen, Hippocrates, and other writers that penetrated slowly into Europe."

Surely this author who comes to possess every reader must have some weakness, some blind spot, some shortcoming. Ah, here it is! In presenting the Scots who became notable as surgeons, grievously, outrageously, unforgivably he refers to them as "Scotchmen" and to the "Scotch." Now we have got him down. He did have an Achilles' heel after all. True he did make humble amends in an added section in which he confesses his own recognition of sin. But few confessions are in order and none demanded.

The legions of prospective readers here are warned that once this book is in hand all duty will be forgotten, all tasks ignored. But get your own copy; don't try to borrow this one. It is being reread.

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INDUSTRIAL MEDICINE AND SURGERY

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ESTABLISHED 1932

Publisher A. D. CLOUD

Volume 26 DECEMBER, 1957 *Number 12*

Cooperative Industrial Health Services—Managerial Attitudes

JUST HOW best to provide commendable occupational health services for the small industrial plant continues to baffle. Among many industrial physicians the method deserving sponsorship is that of group arrangement on an industrial neighborhood basis. This type of enterprise successfully has been operated in a few instances. It may not be asserted that any rapid expansion of this form of health measures is in evidence, and some few organizations have been abandoned.

When in 1957 the Institute for Social Research of the University of Michigan undertook an exploration of managerial attitudes and evaluation of employee health services, one of many objectives was to determine the attitude of management in small industrial plants toward cooperative industrial health services. Foremostly this information was sought from the managements of plants in which no regular medical services were conducted on the premises. The interviews leading to this information did not include any persuasive efforts or any argument in behalf of any form of industrial medical activities, but instead, on a "cold" basis, members of management in 96 plants were asked as to their willingness to join in some shared health arrangement. The responses serve to indicate one of the handicaps to any rapid developments in this form of industrial medical services. Seventy-eight percent of those interrogated declared unwillingness or a pronounced unwillingness to engage in any plans. Conversely, less than 15% of managerial spokesmen voiced willingness or a pronounced willingness to go about such arrangements. The difference in percentages up to 100 represented those who were not interviewed on that point or else had no opinion. It might be inferred that this opposition to a joint enterprise reflected a marked preference for medical services exclusive to the several plants for which responses were being made. Yet the fact remains that no such services had been provided. While the matter was not pursued in the investigation it appears inescapable that much of management in small plants would elect no medical services, depending entirely upon the general practitioners and clinics within the neighborhood or within the community.

Without condoning small plant management estimate of the matter, it does follow that those responsible for the orderly development of occupational health have failed signally to create within the small plant managerial mind any eagerness to provide good industrial medical services or to recognize the values to management and workers alike in such procedures. Further, it is to be recognized that if, for the time being, management prefers to rely upon the general medical facilities of a community for its special industrial medical needs, then beyond debate it becomes imperative that those general practitioners and other community medical services become better qualified as to the particular and peculiar requirements of industrial medicine. Therein lies the marked weakness in all of occupational health at the immediate time. Outstanding specialists in occupational health are making notable contributions within that specialty, but the preponderance of medical service to compensation cases continues to be furnished by physicians to whom the term "specialist in occupational health" is not at all applicable.

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Automobile Accidents and Carbon Monoxide

IN THE CARNAGE that ever attends automobile traffic no one defection accounts for a major percentage of the havoc. Numerous departures from the perfect contribute, from alcohol to impaired vision. One possible contributor so far inadequately appraised is the effect of carbon monoxide from motor exhausts — as hundreds of idling cars await their turn before the red light barrier, or as other hundreds speed along on depressed highways, or as still other hundreds move through the man-made canyons of tall buildings.

Chain tobacco smoking may provide a blood saturation near 3%. Orderly congested automobile traffic might add another insidious 3%, and with a little fortuity a much higher level. Over and over it has been asserted that blood saturation near to 10 or 12% readily falls within the body's safety factor. Possibly this is not true, or not true for all individuals. May low levels of saturation at times impair judgment, slow down reaction times, distort vision?

This possibility no longer is to be left to conjecture. No longer is there the acceptance that already previous investigative work has ruled out all likelihood of any accident causing role of carbon monoxide in traffic accident causation. The School of Public Health of the University of Michigan, operating with funds supplied by the U.S. Public Health Service and cooperating with the Detroit Department of Health, is seeking the exact facts. The blood of victims of auto accidents, collected at the first opportunity after the disaster and usually on emergency entry to a hospital, is being tested for its saturation percentage. In congested traffic areas continuous recordings are being made as to the carbon monoxide content of the air.

Without waiting for the returns from this precise investigation, well it may be believed that defective motor equipment leading to the building up of high concentrations of carbon monoxide within the car contributes to traffic accidents. Such inquiry is not the objective of the study. Rather what is sought is information as to possible evil consequences from the day-by-day congestion of city automobile traffic. The crux of the study may not reside in any demonstrated levels of air concentration or blood saturation. What may prove to be crucial is the possible disclosure that the low concentrations of impaired circulating blood heretofore trusted to be of no damaging consequence, after all require reevaluation as to the extent of biologic imposition. The results of this investigation are awaited. Whatever they may prove, not all traffic havoc will disappear. At best only a nick, large or small, will be made in the final banishment of wasted blood and brains in automobile accidents.

Can We Have a Look?

THE FREE medical examination for executives is generally a confidential affair between the executive and the doctor. But some corporations are beginning to wonder if they shouldn't also know what the doctor finds out. Lukens Steel, for example, has decided that henceforth, if an executive is in line for promotion, the top brass should have a look at the doctor's report. "The company has a substantial investment in its executive personnel," says Lukens' President, Charles L. Huston, Jr. "The company pays for the examination. The company should know about a person's health in order to assign responsibility properly. You cannot rely entirely upon the executive to inform his superior that he is ill." There is undoubted logic in Lukens' position. It might even be the humane position; a corporation probably shouldn't shrug off such responsibilities and just take the attitude, "If a man wants to work himself to death let him." On the other hand, there is another aspect to the question: do corporations have any moral right to such intimate knowledge? Corporate solicitude, some people feel, has already gone far enough, has become an intrusion. And ignoring both this moral aspect and the point that doctors are not omniscient, for the corporation to start peering at executives' cardiograms may well be more damaging to the executives' efficiency than any high blood pressure they may already happen to have.

—From *Fortune*, August, 1957.

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